

## Clinical: Chest

### P-001 Erect positioning of patients for mobile chest-Xrays in the ICU setting

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*Newcastle Upon Tyne Hospitals*

**Introduction:** Our Intensive care unit (ICU) standard is that mobile Chest X-rays (MCXRs) should be performed with the patient erect/semi-erect, unless contraindicated, to facilitate interpretation.

**Aims:** The aim of this audit cycle was to improve compliance with this standard in a tertiary-referral mixed general and neuro-trauma ICU.

**Content:** This audit assessed:

- If 100 % of MCXRs had patient position labelled on the film
  - Of those labelled, how many were supine
  - Of those supine, how many had contra-indication to being erect
- If the overall compliance of erect-positioning for MCXR was 100%

#### **Method:**

Initial audit was done in July looking for the above information. After a review of the initial results, an action plan was determined at the departmental multidisciplinary meeting. Interventions included both intra/interdepartmental discussion and the introduction of educational posters. A repeat audit was taken to assess improvement.

#### **Results:**

	July	November
Labelling	92.86% (65/70)	93.42% (71/76)
Number of MCXRs taken supine	20/70	12/76
Supine CXRs (with contraindication to erect-positioning)	2/20 (both c-spine instability)	4/12 (all post c-spine fixation)
Overall compliance with erect-positioning	76.92% (50/65)	83.09% (59/71)

**Discussion:** The initial audit identified a significant gap in compliance with sitting patients erect for CXR where possible. The implementation of educational strategies, including a specific bedside poster, has made a significant improvement. A further review to identify why cases are not sat up is required to overcome any remaining barriers along with ongoing education to further improve compliance. The relevance of this audit could extend to other ICUs.

### P-002 Fat in the chest - a pictorial review

*Andrew Yeung, Sylvia Worthy;*

*Department of Radiology, Royal Victoria Infirmary, Newcastle upon Tyne*

**Aims/Objectives:** To present a pictorial review of the different manifestations and appearances of fat in the chest.

**Content of presentation:** Fat can have many different manifestations in the chest. Unusual appearances on imaging can be a result of benign or malignant fat-containing processes as well as normal variance. Examples include normal cardiophrenic fat and mediastinal fat to neoplasms such as pulmonary lipomas and liposarcoma. This presentation describes these different processes and

utilises examples from the different imaging modalities. There will be a particular emphasis on plain film interpretation.

**Relevance/Impact:** This educational presentation is hoped to be of relevance to radiologists, radiographers and anyone involved in imaging interpretation of the chest. Familiarity with certain typical appearances of common benign fatty processes will help reduce the number of unwarranted further investigations.

**Outcomes:** Multimodality pictorial review of fat-containing processes within the chest, with a particular emphasis on plain film imaging.

**Discussion:** As well as multiple imaging examples, relevant facts and clinical manifestations will be discussed.

#### P-003 **Imaging of asbestos related disease**

*Zaid Jibri; David Martin, Haydn Adams;*

Morrison Hospital, Swansea; University Hospital Llandough;

**Aims/Objectives:** To familiarise the reader with the imaging features of benign and malignant asbestos related disease.

**Content of Presentation:** We will display the imaging findings of a range of asbestos-related pleural and pulmonary disease which includes benign pleural effusion, parietal pleural plaques, focal visceral pleural thickening, diffuse visceral pleural thickening, malignant mesothelioma, asbestosis and lung cancer. We will also describe the epidemiology and clinical features of these conditions.

**Relevance/Impact:** Asbestos-related disease continues to be an important clinical issue due to the long latent period between environmental or occupational exposure and clinical manifestation. In addition to the imaging findings we will discuss some of the difficulties and controversies in making a diagnosis and attributing causation.

**Outcomes:** To enable the radiologist to recognise the different patterns of disease and their significance in order to understand the aetiology and to direct appropriate management strategies.

**Discussion:** There is a spectrum of asbestos related diseases ranging from those which are common and asymptomatic to those which present as serious debilitating or malignant conditions. It is vital for a radiologist to be able to distinguish between these and aid clinical management effectively.

#### P-004 **Does ultrasound guided chest drain insertion improve clinical outcome in empyema treated with intrapleural fibrinolytics?**

*Christopher Rofe, Ausami Abbas; Faraz Sheikh; Ivan Brown;*

*University Hospital Southampton NHS Foundation Trust*

**Introduction:** The role of intrapleural fibrinolytic agents in the management of empyema remains controversial. Fibrinous bands are characteristic of empyema and make complete eradication of the collection by drain thoracostomy difficult in many cases. The second multicentre intrapleural sepsis trial (MIST2) demonstrated that streptokinase in combination with DNase improved outcomes in patients with empyema. We present our experience of ultrasound guided chest drains in the treatment of empyema treated with intrapleural streptokinase.

**Methods:** A retrospective review was performed of all patients who were diagnosed with empyema on ultrasound in our institution between June 2008 and June 2010. A review of all clinical records and imaging was performed for each patient. Successful clinical outcome was defined by improved radiological appearance, infection resolution and uncomplicated medical discharge. Results were analysed statistically using the Chi Squared Test.

**Results:** Overall 34 patients were identified of which 20 received intrapleural streptokinase. 12 had ultrasound-guided chest drains and 8 had non-ultrasound guided chest drains.

Patients treated with streptokinase had a successful treatment outcome in 8/12 cases that had ultrasound-guided chest drains compared to 4/8 who did not. The difference between the 2 groups was not statistically significant (p-value = 0.65)

**Conclusion:** Our experience suggests that ultrasound-guided chest drain insertion does not improve outcomes in patients with empyema treated with intrapleural streptokinase alone. Further work is required to characterise the role of ultrasound in the management of empyema treated with a combination of intrapleural streptokinase and DNase.

**P-005 Recognising mesothelioma**

*Isabel Laurence, Anthony Edey; Michael Darby;*

*Royal United Hospital, Bath; North Bristol NHS Trust*

**Purpose:** Mesothelioma incidence rates have increased four-fold since the 1980s and are set to increase until 2020. Early diagnosis improves survival rates. Non specific signs and symptoms mean the condition is not readily diagnosed clinically. Imaging plays an important role in the detection of this condition.

**Discussion:** This pictorial essay provides examples of cases of mesothelioma on both CT and CXR. We include examples of cases in which imaging enabled an early diagnosis. Complications including invasion of the chest wall, mediastinum, vertebral column and lung are given. Metastatic mesothelioma, the pattern of lymph node spread and superior vena cava obstruction due to the condition are demonstrated.

**Conclusion:** Treatment for mesothelioma is often delayed until the disease is late in development as diagnosis is difficult in the earlier stages. Most patients are given a poor prognosis of only about a year to live. This poster serves to enable the audience to recognise the condition and it's complications in a timely fashion.

*Jo Southgate*

**P-006 Delays in radiological imaging in patients with suspected pulmonary thrombo-embolism: a complete audit cycle**

*Geeta Kapoor, Jo Southgate*

*Norfolk and Norwich University Hospital*

**Introduction & Aims:** A retrospective audit:

1. assessment of suspected pulmonary thrombo-embolism (PTE) in acute medicine unit (AMU) setting.
2. Delays in radiological imaging within this treatment group.
3. Completion of audit cycle and re-evaluation of intervention strategies.

**Method:**

Audit: 20 patients referred to AMU with "suspected PE" in January 2010.

Re-Audit: 20 patients referred to AMU with "suspected PE" in May 2010, after interventions implemented.

Data on each admission was collected: time and date for request of imaging, whether requested as an inpatient or outpatient scan and finally the date of the examination. Other data also collated, such as, demographics.

Standard: patient's should be imaged within 1 day.

Interventions: "Click for Clots", intranet guidance which outlined safe patient pathway for patients with suspected PTE and 2 daily slots in radiology for imaging for patients from AMU. The audit cycle was then completed.

**Results:**

Audit: 9/20 waited more than 5 days for a scan; 8 were arranged as OP scans.

1 positive (waited 20 days) and 1 treated as had waited 22 days for scan

Re-audit: no-one waited longer than 3 days for a scan and no outpatient scans.

**Conclusion:** Audit: 1 day standard: 40% imaged. 55% scanned within 3 days (from admission). 45% waited more than 5 days (up to 22 days)

Re-Audit:

- 1 day standard: 80% imaged which demonstrates 100% improvement
- 100% scanned within 3 days (from admission)

**P-007 More than just a veil of groundglass: pneumocystis pneumonia unravelled**

*Sharif Abdullah; Shema Hameed; Anoma Lalani Dias; Ashish Gupta; Andrea TC Goncalves; Samanjit Hare;*

*Royal Free NHS Trust; Imperial College NHS Trust; Ottawa Hospital, Canada; Barnet Hospital*

**Aims:** 1. To review the epidemiology and microbiology, reiterating Pneumocystis jirovecii as the responsible pathogen.

2. Critical differences in clinical presentation of PneumoCystis Pneumonia (PCP) in AIDS and non-AIDS-immunosuppressed patients.

3. Typical and atypical HRCT manifestations of PCP.

4. HRCT findings in immune reconstitution inflammatory syndrome (IRIS)

**Content:** 1. Overview of the opportunistic infection PCP with a discussion of recent changes in nomenclature and changing epidemiological trends.

2. Pathophysiology of PCP infection using biopsy proven cases.

3. Pictorial review based on temporal evolution, with a discussion of acute, subacute and chronic PCP, including end-stage manifestations such as interstitial fibrosis and cystic lung disease.

4. Pathology and imaging of IRIS, which classically presents with an organizing pneumonia pattern on HRCT.

**Discussion:** "PCP" remains the term of choice amongst radiologists despite the re-classification of P. carinii to P. jirovecii. Whilst the incidence of PCP in AIDS decreases, in non-AIDS-immunocompromised patients it is on the rise, with significantly differing clinical presentations. This exhibit demonstrates the typical and more unusual findings of PCP on HRCT, with an emphasis on temporal evolution: acute, subacute and chronic appearances are reviewed. HRCT imaging of IRIS in PCP is also discussed.

**P-008 Comparison of single source ECG gated versus dual source ungated flash CT scanning of the thoracic aorta**

*John Curtin; Philip Yoong; Catherine Johnson;*

*Norfolk and Norwich University Hospital*

**Introduction:** Cardiac motion degrades the images of the thoracic aorta on CT angiography. ECG gating prevents this, but is associated with a larger patient radiation dose. High pitch dual source CT scanning (Somatom Definition Flash, Siemens Healthcare) has a very high temporal resolution which might eliminate motion artefact without ECG gating. We compare image quality and radiation dose in single source ECG gated and dual source ungated Flash scanning of the thoracic aorta.

**Methods:** We analysed 13 consecutive ungated Flash CT scans and 13 consecutive ECG gated scans performed for possible aortic dissection. We assessed the scans for motion artefact and recorded the radiation dose and noise.

**Results:** All 26 scans were diagnostic. There was motion artefact on 1 out of 26 scans (an ECG gated scan). There was slightly more image noise on ungated Flash scans (21 HU v 16 HU). The radiation dose from the ungated Flash examination was only 40% of that delivered by the ECG gated examination - 8.6 v 21.6 mSv (P<0.001).

**Discussion:** Ungated Flash and ECG gated CT scans are equivalent in terms of scan quality and diagnostic accuracy but ungated Flash reduced the radiation dose by a factor of 2.5. We therefore advocate use of dual source ungated Flash CT for the assessment of the thoracic aorta in centres where this is available.

## Clinical: Cardiac

### P-009 Cardiac CT angiography – minimising the radiation dose

*Will Hicks; Stephen Lyen; Andy Beale;*

*Great Western Hospital*

**Aims/Objectives:** This poster reviews the radiation dose-reduction strategies in cardiac CT and sets out a 5 point plan to minimise dose for every patient.

**Content:** Brief descriptions of the methods of ECG gated acquisition, scan volume reduction, low kV techniques, automated tube modulation, and breast elevation. We describe the application of these techniques to patients of different body habitus and how, when used in combination they significantly reduce dose.

**Relevance/Impact:** CT Cardiac Angiography dose should be lower than for conventional diagnostic cardiac angiography. Achieving as low a dose as possible whilst maintaining image quality involves tailoring the technique and protocols to individual patients.

**Outcomes:** By applying this stepwise dose minimising method we have reduced estimated dose to lower than 1 mSv in some cases. Although the dose will often be higher than this, we are confident that using this tool will optimise dose reduction.

**Conclusion:** We provide a 5 point dose reduction strategy that can be applied to every Cardiac CT to minimise the radiation dose.

### P-010 Impact of NICE guideline on cardiac imaging requests for “chest pain of recent onset”

*Vincent Leung, Chen Low; Alp Notghi;*

*Sandwell & West Birmingham Hospitals NHS Trust*

**Introduction:** The NICE guidance “Chest Pain of Recent Onset” recommends that patients who present with possible new stable angina should have clinical stratification to further imaging. The aim of the review was to assess the change in practice following NICE guidance and future usage of imaging modalities in a teaching district general hospital setting.

**Methods:** A retrospective review of MPI requests over a 3 month period (January - March 2011) at a department servicing two DGHs in a Trust without CT Calcium scoring was carried out. Exclusion criteria: (i) imaging not to assess angina, (ii) insufficient clinical details, (iii) known CAD. Their clinical risk was stratified as per the NICE guidance using age, gender, symptoms and risk factors. The MPI results were then reviewed.

**Results:** There were 538 MPI requests, 255 were included, which were referred with chest pain of recent onset and sufficient clinical details. The number of patients in each risk group (number abnormal MPI) were as follows : <10% risk = 30 (17), 10-29% risk = 55 (24), 30-60% risk = 74 (36), 61-90% risk = 69 (30), >90% risk = 27 (16).

**Discussion:** Based on clinical risk, 198 patients (77%) did require imaging for further risk stratification following the NICE guidelines. However, 55 of 198 (28%) were appropriate for CT Calcium Scoring. Moreover, there were abnormal MPI results in all groups. Of note, 48% of patients in the <30% risk categories had ischaemia. This suggests functional imaging may be required in a higher proportion of patients.

### P-011 Intrinsic cardiac masses for the general radiologist: an MDCT study

*Katharine Orr; Sarah Hamilton; Michael Williams;*

*Peninsula Radiology Academy; Derriford Hospital, Plymouth*

**Aims/Objectives:** To provide a pictorial review of cardiac masses as seen on MDCT for the non-specialist radiologist.

**Content of presentation:** A review of cardiac filling defects seen on MDCT including common causes such as pseudomasses from poor mixing of contrast enhanced and non-contrast enhanced blood, true thrombi, ruptured papillary muscles and atrial myxomas as well as rarer causes such as other

primary cardiac tumours, metastases from testicular tumours, squamous carcinoma and myeloma and tumours growing down veins into the heart from bronchial carcinoma, hepatoma and renal cell carcinoma.

**Relevance/impact:** Cardiac masses are relatively uncommon but general radiologists using MDCT now recognise more cardiac abnormalities. This pictorial review of cardiac masses illustrates some of these.

**Outcomes:** To raise awareness of the differential diagnoses of cardiac filling defects.

**Discussion:** The most common cause of a cardiac filling defect is thrombus. However, there are other diagnoses which have similar appearances on MDCT which are important to consider.

Metastatic cardiac tumours are 20 – 40 times more common than primary neoplasms. Of primary cardiac tumours, 75% are benign (half of which are myxomas) and 25% are malignant.

#### P-012 **NICE guidance for recent onset chest pain: time to be broken?**

*Sharon Brown; Vikram Raju; Prageeth Dissanayake; Carl Roobottom; Gareth Morgan-Hughes; Peninsula Radiology Academy; Derriford Hospital, Plymouth;*

In our institution we perform coronary calcium scoring and subsequent CT coronary angiogram (CTCA), on all patients referred for investigation of coronary arteries. In current NICE guidance for investigation of suspected coronary artery disease, patients with high Agatston scores are advised to undergo invasive angiography without CTCA, due to perceived inaccuracy from calcification. We use new generation high-definition HDCT scanners for cardiac imaging which increase diagnostic accuracy. We proposed that many patients with high calcium levels, but HDCT-proven stenoses are treated without further diagnostic procedures, thereby reducing both cost and time to treat.

**Methods:** Departmental computer systems were interrogated to identify patients with Agatston scores over 400 scanned using our HDCT scanner during 2010. CTCA findings of these patients were compiled from radiology reports, plus information regarding further investigations and management were obtained from cardiology departmental records.

**Results:** 59 patients were retrospectively identified with high Agatston scores proceeding to HDCTCA. 24 (41%) patients underwent subsequent diagnostic invasive angiography within 6 months.

The remaining 35 patients did not undergo additional invasive angiogram. Of these, 3/35 (8%) had no CT-detected stenosis, 6/35(17%) had mild and 28/35(80%) had moderate/severe stenoses.

**Conclusions:** Treating solely on CTCA results saved 35 invasive angiograms during 2010. From the national tariff, the overall cost of an invasive angiogram is £995, therefore during 2010 a total £34825 has been saved. We conclude that HDCTCA alone is sufficient to guide treatment in a majority of patients with coronary artery disease, even in the presence of extensive coronary artery calcification.

### Clinical: Vascular

#### P-013 **Congenital and acquired variants of the left brachiocephalic vein and its branches – implications for cardiac and radiological interventions**

*Rhys Llewelyn, Southwest Peninsula Radiology Programme*

**Aims:** To delineate by MDCT variants of the left brachiocephalic vein relevant to venous vascular interventions.

**Content:** A series of cases of venous anomalies of the left brachiocephalic vein with actual or potential difficulties in transvenous interventions are shown. These include left SVC, double SVC, left vertical vein, left vertical vein with partial anomalous pulmonary venous drainage, left subaortic brachiocephalic vein and rarer connections with the azygous system. Multiplanar reformatting helps in delineating the precise anatomy.

**Outcome:** An explanation of anomalous anatomy which may complicate venous vascular interventions and thus reduction of risk to patients.

**Relevance:** An estimated 200,000 procedures are performed annually in the UK requiring central venous access, including placing lines for secure access, large volume exchange, transvenous

pressure measurement and pacing. As fluoroscopic guidance is not always used unsuspected venous anomalies can complicate these procedures.

**Discussion:** Anomalous vessels may present incidentally to all CT radiologists and be mistaken for other structures. Detection is important clinically, as the population undergoing thoracic scanning has a greater chance of undergoing procedures involving central venous catheterisation.

**P-014 CT findings of rupture, impending rupture, and contained rupture of abdominal aortic aneurysm: the common, the uncommon, and the rare**

*Mohammed Ahmed; Nazik Abdalla, Lynn Ling,  
Hull Royal Infirmary*

**Introduction:** AAA affects 5-10% of men aged 65-79, with incidence increasing as a consequence of the aging population. Rupture is the most common and devastating complication of aortic aneurysm and is responsible for 7,000 deaths each year in the UK. Although the imaging findings of abdominal aortic aneurysm rupture are usually obvious, contained and impending ruptures can be subtle. Careful examination of the morphology of the aneurysm and familiarity with uncommon and rare presentation are essential skills for reporting radiologists.

**Method:** Retrospective study. All patients who had open repair or endovascular repair of rAAA over last 5 years were traced from the vascular department database. All imaging were reviewed. Data collected from operative, medical notes and clinic letters. Retrospective review of the CT imaging of (86) patients with mean age of 65 years and 85% were men.

**Results:** We present a series of imaging examples with explanation and comments. We also explain the reason for decision to whether open repair or EVAR was performed. Examples includes; rupture, Aortocaval and Aortovisceral fistula, subtle impending rupture and others with explanation.

**Conclusion:** Prompt detection of abdominal aortic aneurysm rupture is critical because survival is improved by emergent surgery. Identification of impending or contained rupture is equally important because these patients are at risk for frank rupture but can generally benefit from a more thorough preoperative assessment. Interpreters of these studies should be familiar with the common, uncommon and rare

**P-015 Imaging in large vessel vasculitis: a case series**

*Russell Young; Sarah Ann Baker; Atique Imam; Lyn Williamson; David Collins; Elizabeth Price;  
The Great Western Hospital Swindon*

**Introduction:** Large vessel vasculitis, including Takayasu's arteritis, is uncommon in the UK. Clinical presentation is frequently nonspecific and laboratory tests non-discriminatory, therefore imaging has a central role in diagnosis and disease monitoring, involving several modalities including CT and MRI (with angiography), FDG-PET and ultrasound.

**Methods:** A case series of five patients with large vessel vasculitis is presented with relevant imaging studies. The patients were assessed between 2001 and 2011.

**Results:** 4 females and 1 male aged between 40 and 63 years at diagnosis are included, 3 with Takayasu's arteritis and 2 with inflammatory aortitis. The time from symptom onset to diagnosis varied from 6 weeks to 28 months. The imaging modalities used for diagnosis in each case were: MRI, MR angiography, contrast CT, CT angiography and arterial Doppler ultrasound. In 2 cases the diagnosis of large vessel vasculitis was suspected clinically; in 3 cases imaging studies suggested the diagnosis. One case with Takayasu's arteritis had a negative contrast CT despite positive clinical features and raised inflammatory response; MR angiography 7 months later made the diagnosis. Another case showed evidence of aortitis on contrast CT, but not on MR angiography performed after 5 days of prednisolone treatment. In the case diagnosed with CT angiography, the optimum delay post contrast to show vessel wall enhancement was found to be 6 minutes. FDG-PET was not used.

**Discussion:** Our experience supports the view that a multimodality approach is required in the imaging of large vessel vasculitis. CT angiography is able to show vessel wall changes in early lesions;

delayed images may also be useful to assess disease activity. MRI angiography avoids radiation exposure but may be limited in its ability to define disease activity. FDG-PET has the highest sensitivity and can show disease extent and treatment response, however is less specific and availability is limited. Our series demonstrates that changes are not always identified using CT or MRI alone and that they are best used in combination if one shows a negative result. We recommend using CT or MR angiography with delayed images at 6 minutes. FDG-PET is most sensitive for follow up if available, but CT or MR angiography can also be used for assessing response to treatment.

**P-016 Segmental arterial mediolysis- endovascular management**

*Thomas Snow; Nivmand Khorrami; Andrew Strahan;*

*Gold Coast Health Service District; Griffith University;*

Segmental Arterial Mediolysis is an important cause of abdominal haemorrhage, which has characteristic clinical and radiographic features. A series of 5 cases is presented, which were managed successfully by endovascular coil occlusion. The pathophysiology and incidence of SAM will be discussed, with a brief review of the literature.

**P-017 Combined axillary-femoral approach for recanalization and stenting of aorto-iliac occlusions: technique, outcome and complications**

*James Lay, Royal Bolton Hospital*

**Aim:** We share our experience of a combine axillary-femoral approach to treat complex aorto-iliac occlusions in five patients.

**Content:** Step-by-step diagrammatic description of technique

Case presentation

Tips and discussion of alternative approaches

**Relevance/impact:** Recanalization of occluded aorta and iliac arteries is technically demanding. Recent BSIR Iliac Angioplasty and Stenting (BIAS) III Registry reported failure to cross lesion in 1.9% of segments. We believe the combined axillary-femoral approach is a safe and efficacious method to treat occlusions that cannot be transversed by an ipsilateral retrograde or contralateral crossover approach, although in one case there is mild long term procedure related morbidity.

**Outcome:** Bilateral critical ischaemia – distal aorta and bilateral common iliac occlusion – right iliac stent and crossover graft – symptom free survival for 6 months – none

Bilateral claudication – bilateral common iliac occlusion – bilateral iliac stents– symptom free r over 5 years – none

Left critical ischaemia (previous right amputation) – infra-renal aorta and bilateral common and external iliac occlusion – left aorta and iliac stents – symptom free over 2 years – none

Bilateral iliac claudication – bilateral common iliac and left external iliac occlusion – bilateral iliac stents – both stents and aorta occluded after 6 months – none

Bilateral claudication – bilateral common iliac occlusion – bilateral iliac stents – symptom free over 2 years – left median nerve palsy

**Discussion:** Even very long aorto-iliac occlusion can be successfully treated by this method, but patients should be specifically warned about the risk of brachial plexus injury.

**P-018 WHO safety checklist audit**

*Gibran Timothy Yusuf; Michelle Mtandabari;*

*King's College Hospital*

**Aims/ Objectives:** A preliminary evaluation of completion rates of WHO safety checklist.

**Content:** Analysis was conducted for completion of WHO checklist including sign in, sign out and time out. Furthermore completion of the locally designed pre-intervention checklist was audited.

**Relevance/Impact:** The WHO interventional radiology checklist is based on the recent surgical checklist. The principle is potential communication errors are eradicated reducing avoidable



complications. The checklist is new to radiology and deemed mandatory. It is critical to ensure uptake to avoid potential complications and comply with national objectives.

**Outcomes:** 100 cases analysed were analysed at a tertiary centre. The majority of which were angiogram/angioplasty and chemo-embolisation

The pre-intervention ward checklist was completed in 82%.

Sign in was performed in 83%, however sign out was only performed in 65%. When general anaesthetic was used only 50% had time out read.

**Discussion:** It is not easy to prove the checklist will prevent complications, however as a simple tool it provides reassurance and asserts value to members of the team. Perhaps the most dangerous part of the procedure (general anaesthetic) may be the worst completed (time out), maybe due to its infrequency. Furthermore the sign out is poorly completed, perhaps due to time pressures, but indicates the potential to omit critical details. Poor retrievability of data was a problem, along with poor completion of the checklist opens potential for litigation. Alteration of the checklist to create a user-friendly approach and place an onus on the interventionalist to become a named responsible individual.

#### P-019 **Efficacy of surveillance and radiological interventions in haemodialysis arterio-venous fistulae**

*Anupama Nair; Sreenath Pillai; Harikrishnan Nair;*

*Glan Clwyd Hospital*

**Introduction:** Haemodialysis(HD) access failure is a major cause of morbidity and hospitalisation in patients on haemodialysis and accounts for approximately 20% HD patient hospitalisations in the United States with a cost of 1 billion dollars annually. An access flow less than 500ml/min is associated with increased risk for access failure but evidence is lacking on the effectiveness of strict surveillance and timely intervention.

**Aim:** All arteriovenous fistula interventions over a 3 year period in a District General Hospital were studied to assess effectiveness of monitoring and timely intervention of renal vascular access sites in ensuring its long term patency. 70 interventions on 52 patients were carried out with a mean age of 69 years. The majority (66%) of interventions were on left arm fistulae. Above 80% of radiological corrective interventions were achieved in the first 2 weeks from diagnosis. Venoplasty predominated (67%) and the need for arterial interventions including thrombolysis were minimal. While 8% of fistulae failed within one year of the corrective procedure, vast majority (63%) were being used as primary access for haemodialysis at one year follow up and the rest were lost due to transplantation or death. The vascular access MDTs were a crucial factor in achieving standards recommended by Renal Association.

**Conclusion:** Monitoring and surveillance with subsequent pre-emptive radiological intervention improves outcomes in AV fistula survival with consequent reduction in patient morbidity, hospital admissions and cost of health care delivery. Access monitoring and multidisciplinary intervention should thus be integrated as part of routine dialysis care.

#### P-020 **Distinguishing complications from normal expected imaging appearances post transhepatic arterial chemoembolisation (TACE) – a pictorial review**

*Rajeev Ravi; Ashok Katti; Elizabeth O'Grady;*

*University Hospital Aintree; Wirral University Teaching Hospital;*

**Aims/ Objectives:** To depict the normal imaging appearances of the liver post TACE and illustrate the recognised complications following this procedure.

**Content:** We present a brief description of the relevant hepatic anatomy and different TACE techniques. The normal imaging appearances of the liver seen on ultrasound, CT and MR imaging after TACE are depicted in a pictorial review and a concise explanation is provided. We also illustrate a few cases of recognised complications following TACE procedures at our tertiary hepatobiliary centre.

**Relevance:** Contrast enhanced CT, ultrasound and MR are now routinely widely used in the follow up of patients undergoing TACE to determine the extent of tumour necrosis and detect the presence of residual tumour, recurrence or complications like abscess formation, rupture or haemorrhage.

**Outcome:** In our experience, follow up imaging of patients undergoing TACE at our centre is often performed at the referring hospital. Awareness of normal imaging appearances following TACE and the early recognition of complications by radiologists enables them to guide clinicians to initiate appropriate treatment.

**Discussion:** TACE is increasingly becoming the mainstay for treatment of unresectable liver tumours. It has been shown to reduce tumour size, provide palliation and improve survival. The wide variety of TACE techniques contribute to different imaging appearances and consequently requires tailoring of appropriate follow up imaging modalities by the radiologist. Distinguishing normal imaging appearances from complications helps reduce unnecessary intervention and thus minimizes patient morbidity.

#### Clinical: GI

##### P-021 **The use of ultrasound scanning in the diagnosis of impalpable groin hernias**

*Alvin Karsandas,*

*Northumbria Healthcare NHS Trust, Gateshead Health NHS Foundation Trust;*

**Purpose:** Ultrasound scanning uses high frequency sound waves to create images of the body. It is non-invasive, does not involve ionising radiation, and is especially useful in the imaging of soft tissues. Hernias can present with persistent groin pain, but often clinical examination is normal or inconclusive. The aim of our study was to demonstrate the use of ultrasound in the diagnosis of impalpable groin hernias.

**Methods:** We looked at patients who presented to a single surgeon's outpatient clinic with a history suggestive of a groin hernia, but no palpable hernia found on clinical examination. Patients who presented between 1st January 2009 and 31st December 2009 were included in the study. All patients underwent ultrasound scan. Patients whose scan suggested a hernia were operated on, while those patients whose scans were normal were followed up at 6 months.

**Results:** Twenty nine patients underwent groin ultrasound during the study period. Sixteen of these were found to have scans suggestive of a hernia. Thirteen patients had negative scans. Of the 16 patients with positive scans, all 16 were found to have a hernia at operation. At 6 months, all patients with a negative scan were either symptom free or had an alternate diagnosis for their groin pain.

**Conclusion:** In the past, herniography and explorative surgery were used in the investigation of occult hernia. However this study has shown that ultrasound offers a cheap, non-invasive method of accurately diagnosing or ruling out impalpable hernias.

##### P-022 **The many faces of abdominal lymphomas : a pictorial review**

*Vishal Bhalla; Arun Jacob;*

*University Hospital North Staffordshire, Stoke-on-Trent*

**Objective:** To highlight the varied radiological appearances in abdominal lymphoma.

To discuss some of the atypical appearances and disease patterns of extra nodal disease.

Using illustrations, demonstrate some of the diagnostic challenges in this condition.

To emphasize the need for a multi-modality approach in investigating and monitoring this disease process.

**Content:** This pictorial essay is divided anatomically and each site of involvement is discussed separately. Using a wide range of ultrasound, MPR CT and MRI images, we demonstrate involvement of the hepatobiliary system, gastrointestinal and genitourinary tracts. We also describe some less common disease patterns including involvement of the peritoneum and anterior abdominal wall.

In a separate section, we discuss some of the diagnostic dilemmas, in a case discussion format. The role of MRI and PET CT as problem solving tools are also illustrated.

**Relevance:** The gastrointestinal tract is a predominant site of extra nodal non-Hodgkin's lymphomas. Although primary NHLs of the GI tract account for 1-4% of gastrointestinal malignancies, secondary GI involvement is common accounting for 10% of patients with limited stage NHL at the time of diagnosis and up to 60% of those dying from advanced NHL.

**Discussion:** Abdominal lymphomas though less common have serious management and prognostic implications when compared to other diagnoses. Imaging features can be varied and a multidisciplinary approach to diagnosis and surveillance is vital.

Our review is intended as an overview of abdominal lymphomas, which may be of interest to radiographers, trainee radiologists and clinicians alike

**P-023 A pictorial review of three cases of amyand's hernia – MDCT appearances**

*Amjad Mohammed, Sarah Swift*

*Leeds Teaching Hospital NHS Trust, Leeds. ; St.James's University Hospital, Leeds*

**Aims/ Objectives:** To know the CT appearances of Amyand's hernia and the features of its subtypes.

**Content:** A poster of the "CT appearances of the Amyand's hernia - a pictorial review of three cases".

**Relevance/Impact:** Amyand's hernia is a rare type of inguinal hernia in which vermiform appendix herniates. Only 1% of hernia surgeries find the appendix within the hernia sac, whilst only 0.1 % is diagnosed appendicitis in the hernia sac. There is slight male predominance and most female patients are post-menopausal with true femoral hernias. Previously Amyand's hernia is almost always diagnosed intra-operatively. With increasing pre-operative usage of CT, this condition is also being frequently encountered on CT.

**Outcomes:** A pictorial review of at least three different cases of Amyand's hernia, including a normal appendix, an inflamed appendix and a recurrent inguinal hernia containing a normal appendix has been shown. The different sub-types of Amyand's hernia and its CT features are also described.

**Discussion:** Although Amyand's hernia is rare, it's important to know the CT appearances and the features of its subtypes as its classification determines the subsequent management.

**P-024 Computed tomographic oesophagography for suspected oesophageal rupture: our local experience**

*Jamshaid Anwar, Ian McCrea;*

*West of Scotland Radiology Training Scheme; Victoria Infirmary, Glasgow;*

**Aims:** This poster aims to describe our local experience of using a CT oesophagography technique in the evaluation of suspected oesophageal rupture.

**Content:** Oesophageal rupture is an emergency presentation that is associated with significant mortality. It requires urgent investigation to allow timely diagnosis and treatment with a view to improving survival. Traditionally the radiological diagnostic test of choice has been fluoroscopic oesophagography. A CT oesophagography technique for suspected oesophageal perforation has been described previously in the literature and can offer possible advantages over fluoroscopic oesophagography. This poster presents our local experience of using CT oesophagography with a review of the technique and the published literature.

**Outcomes and Discussion:** We have found this technique useful in investigating suspected oesophageal ruptures in an emergent setting . As previously documented in the literature: employing this technique may save time, avoid mobilizing potentially critically-ill patients between CT and fluoroscopy rooms and obviate the need for a radiologist to be physically present during the investigation allowing for a greater use of teleradiology reporting in a multi-site institution. However, issues of radiation dose and cost also need to be carefully considered.

**P-025 Radiological patterns of systemic disease affecting the spleen**

*David Little; Isabel Laurence; Dominic Fay; Sanjay Gandhi;  
North Bristol NHS Trust; ; Royal United Hospital, Bath;*

**Purpose:** Pathology within the spleen detected by imaging can be the first indicator of disease. The pattern of abnormality can be used to generate a differential diagnosis and guide further investigation and management.

**Discussion:** We present a series of cases including splenic metastases, splenic infarcts with aortic occlusion, splenic emboli due to splenic artery aneurysm, renal and splenic infarction secondary to cardiac thrombus and splenic infarction due to splenic vein obstruction by a pancreatic carcinoma. Examples of splenic artery aneurysms treated with various endovascular techniques are also provided. A brief remainder of splenic anatomy, blood supply and function is given.

**Conclusion:** This pictorial review highlights the importance of splenic interrogation when imaging the abdomen, and serves to remind the audience of the appearances of splenic abnormality in systemic disease.

**P-026 Pancreatic transplant complications: imaging assessment and clinical outcomes**

*Shema Hameed, Anoma Lalani Dias; Chris Harvey; Steven Moser;  
Imperial College NHS Trust; Hammersmith Hospital,*

**Aims:** Transplant imaging has become a fundamental tool in the post-operative assessment of transplant grafts, however this can prove challenging and should always be evaluated alongside an accurate clinical assessment. We aim to review: 1. The variations in surgical anatomy commonly utilised for pancreatic transplantation. 2. The multimodality imaging appearances of the normal pancreatic transplant, including ultrasound, CT, MRI and angiography. 3. The imaging appearances of a spectrum of commonly and rarely encountered pancreatic transplant complications.

**Content:** An illustrated guide of the surgical anatomy involved in pancreatic transplantation, with brief descriptions of the various different types of transplantations currently used. A pictorial review of the multimodality imaging appearances of post-operative complications including graft rejection, pancreatitis, arterial and venous thromboses with graft infarction, pseudoaneurysms, arteriovenous fistulae, exocrine leaks, haemorrhage, fluid collections, abscesses and anastomotic small bowel obstruction.

**Discussion:** Pancreatic transplantation has become a well-established treatment for diabetes that has become increasingly utilised worldwide. However it is a significant procedure with potential risks. Prompt diagnosis of post-operative complications is vital for graft salvage, and imaging has become a central requirement in this group of patients. A multi-modality approach is encouraged, with accurate clinical correlation due to the multiple diagnostic challenges encountered. We will discuss here the various imaging tools available for graft assessment, including ultrasound with Doppler and microbubble contrast, multi-phase CT, MR and MRA, and angiography, with illustrations of a spectrum of surgical and non-surgical complications.

**P-027 MR enterography reduces dose in patients undergoing small bowel imaging in Crohn's disease**

*Rebecca Dixon; Joseph Hamill; Mark Robinson;  
Department of Radiology, Royal Gwent Hospital*

**Aims:** To calculate the reduction in radiation dose achieved by using MR Enterography (MRE) in place of CT Enterography (CTE) or Barium Follow Through (BFT).

**Content:** Assessment of the number of MR Enterograms carried out on patients with proven or suspected Crohn's disease over a 3 year period in a DGH and calculating the radiation dose that they would have received from CTE or BFT.

**Relevance Impact:** Crohn's is a chronic disease affecting a young patient population which will often require multiple examinations for diagnosis, assessment of extraluminal complications and response to therapy. MRE is a newly established technique which is both accurate and radiation free.

**Outcomes:** MRE was carried out in 281 patients over 3 years, resulting in 298 examinations. 12 patients underwent multiple MRE studies. This resulted in a potential radiation dose reduction per patient of 8 mSv per examination compared with CTE and 3 mSv with BFT. 1 patient underwent 6 MRE studies during the study period with a potential dose saving of approximately 48 mSv.

**Discussion:** MRE is an excellent imaging modality for the assessment of Crohn's disease and its complications. MRE should be considered as a primary imaging tool for use in young patients with suspected or proven Crohn's disease to reduce their lifetime cancer risk.

P-028 **Understanding bariatric surgery: what a radiologist needs to know**

*Anish Patel, Peter Chapman*

*Royal Devon and Exeter Hospital*

**Introduction:** Obesity is now a problem, which has reached epidemic proportions in the UK. In conjunction with this increase there is an increase in the number of patients seeking a surgical solution.

There are a variety of surgical procedures that are used and radiology plays a crucial role in the follow up of these patients especially during the investigation of post operative complications. Many general radiologists are unfamiliar with the nature of the procedures and their appearances following these procedures.

This exhibit aims to give the general radiologist a better understanding of the anatomy of the commonly performed bariatric procedures.

**Methods/Results:** The anatomical appearances of the following commonly performed procedures will be discussed and schematically depicted:

Roux en Y gastric bypass

Adjustable surgical banding

Sleeve gastrectomy

Biliopancreatic diversion with duodenal switch

**Discussion:** The incidence of bariatric procedures is ever increasing as a result of rising obesity levels. Radiology is critically important in the management these patients especially in the immediate post operative period and in the diagnosis of potential complications.

The general radiologist should have an understanding of the commonly performed bariatric procedures.

Understanding the normal and abnormal appearances are fundamental in managing and optimizing the recovery in this challenging group of patients.

P-029 **CT IVU decide...**

*Gavin Clague, Jennifer Rowlands; Janice Ash-Miles; Jes Green;*

*Gloucestershire Hospitals NHS Trust; University Hospitals Bristol;*

**Objectives:** To establish the techniques used during Computed Tomography Intravenous Urography for the investigation of haematuria across our deanery in order to determine whether there are common themes which can be used to recommend best practice.

**Content:** This was a multi-centre study during which questionnaires were sent to Uroradiologists in seven local hospitals. Specific questions related to phase of imaging, bolus technique, dose parameters, hydration, diuretic administration, use of compression and variation depending on known diagnosis.

We received replies from six institutions and found that all perform unenhanced imaging of the kidneys ureters and bladder during the first phase. One institution administers frusemide prior to contrast injection, 4 administered oral hydration within 30 minutes prior, 4 performed combined nephrographic and excretory phase imaging with split boluses of contrast whilst 2 performed nephrographic imaging of the kidneys followed by excretory imaging of the kidneys, ureters and bladder.

One centre still prefers traditional IVU if the patient is young, 2 for stone follow up and 1 out of hours. If known TCC, one centre also scans the chest.

For stone disease all perform unenhanced imaging only.

**Relevance/Impact/Outcomes:** The CT IVU is fast replacing the traditional IVU in most departments placing a large burden on resources. In the absence of a universal technique each institution needs to establish which methods work best for them. We have provided some examples.

## Clinical: Uroradiology

### P-030 **Incidental urological findings on CT colonography**

*Mark Hawkins; Stephen Lyen; Andy Planner;  
Great Western Hospital*

#### **Aims/Objectives**

- 1) To illustrate the range of incidental urological findings encountered on CT colonography in a symptomatic population.
- 2) To discuss the features that may help to distinguish between pathologies.
- 3) To discuss appropriate radiological management and further imaging where appropriate.

**Content:** We reviewed 525 reports from CT colonography examinations performed between Jan 2010 and June 2011. Images of clinically significant and unusual urological lesions were collected for this pictorial review and where possible comparison was made to further imaging, operative and endoscopic findings.

**Relevance/Impact:** There has been an increase in the use of CT colonography and in the investigation of symptomatic patients with lower GI symptoms. The major difference with CT techniques compared to traditional methods of investigation is the detection of extra colonic findings. The majority of patients with incidental urological findings will require further medical input. We compare our findings to the current literature and describe and illustrate the range of pathologies encountered as well as demonstrating features that may help to distinguish between pathologies.

**Outcomes:** Of the 525 cases, significant extracolonic urological findings included: Renal cell carcinoma (1), bladder carcinoma (3), TCC kidney (1), renal lymphoma (1), xanthogranulomatous pyelonephritis (1), PUJ obstruction (1) and bilateral duplex kidneys (1) and locally advanced prostate cancer (1)

**Discussion:** Urological findings are common findings in CT colonography, whether incidental or mimicking the non-specific symptoms of colon cancer. Careful review of the urinary tract can often unearth a variety of conditions which have an impact on patient management.

### P-031 **Solid renal masses – diagnostic correlation of CT findings and pathology post partial nephrectomy. a single institution, 2.5yr retrospective study**

*Ayokunle Ogunqbemi; Miles Walkden; Navin Ramachandran;  
UCLH Department of Radiology; Whittington Hospitals NHS Trust;*

**Aims/Objectives:** To determine our sensitivity and false positive rate for CT suspected primary renal malignancy. Identify imaging characteristics of pathologies most often result in false positives.

**Content:** CT reports were retrospectively reviewed on all patients who underwent a partial nephrectomy for suspected primary renal malignancy at our institution from 09/08/2006 to 09/01/2009. Comparison was subsequently made to the pathology report.

**Relevance/Impact:** The diagnosis of suspicious renal masses is rising with increasing use of abdominal CT scanning. Most CT suspected malignancies are currently managed by surgical resection with the attendant risks. False positives may lead to unnecessary surgery.

**Outcomes:** Total of 69 patients.

55 positive on pathology, 14 benign.

CT imaging - 65 diagnosed as malignant, 4 as non-malignant (decision to excise was made subsequently at MDT).

Of the 65 CT malignancies, 13 false positives, 52 true positives.

Of the 4 CT benign, (subsequently revised on MDT), 3 were false negatives.

Our CT sensitivity over the period = 94.5% (52/52+3). False positive rate 20% (13/65).

Of the false positives, oncocytomas (46%) and angiomyolipomas (23%) were most common.

**Discussion:** 20% of patients with CT suspected renal malignancy may be undergoing unnecessary surgery. Characteristic imaging features of oncocytoma and angiomyolipomas have been described.

In practice they are often difficult to distinguish. Unexpectedly, 4 false negatives were obtained.

Some of these were avoidable had a triple phase CT scan been performed.

Study highlights importance of radiology led multidisciplinary teams. Has led to new protocols based on imaging characteristics of common renal masses.

#### P-032 **Contrast induced nephropathy: a study of inpatients undergoing body CT**

*Alvin Karsandas; John Robinson; Peter Bartholomew; Philip Lord;*

*Northumbria Healthcare NHS Trust; Gateshead Health NHS Foundation Trust;*

**Purpose:** Contrast induced nephropathy (CIN) is a major cause of iatrogenic renal failure associated with significant morbidity and mortality. However, it is preventable. CIN is defined as a rise in serum creatinine by 44micromols/l or 25% in the 3 days following IV contrast administration (ESUR guidelines 2007). Within our institution, clinicians requesting an investigation requiring IV contrast need to provide a recent EGFR for the patient.

**Methods:** We looked at all inpatients who underwent body CT scans requiring contrast (100mls Omnipaque), over a six week period in 2011. We looked to see whether an accurate, recent EGFR value was provided and whether the request was vetted by a consultant radiologist. We checked whether contrast was administered to patients with abnormal renal function, and if so, what their post-contrast renal function was.

**Results:** 198 patients were included in our study. Only 132 patients (66%) had request forms with a correct EGFR value. There was documentation of the vetting process for 176 requests (88%). As a result of the vetting process, 14 patients were not given IV contrast due to their poor EGFR. Seven patients had pre-and post-contrast EGFR values which fulfilled the criteria for potential CIN.

**Conclusion:** Despite local protocol, a significant proportion of patients (34%) did not have an accurate, recent EGFR value provided on their request form. The potential for contrast induced nephropathy is real and measures should be taken to try and reduce the risk. We made several recommendations to try and reduce this risk within our institution.

#### P-033 **Scrotal ultrasound referrals: current trends**

*Vijay Rao Gudla; Syed. A.R Mustafa; Soumya Tangudu; Dennis Cochlin;*

*University Hospital of Wales; Pinderfields General Hospital; Cardiff and Vale University Health Board;*

**Aims:** Our aim was to study all scrotal ultrasounds referrals with a view to assess appropriateness of requests.

**Content:** Data was collected retrospectively of all scrotal ultrasounds performed over a three month period using PACS, radis, request forms and patient administration system.

**Relevance:** We perform approximately 2600 scrotal ultrasounds annually in our university hospital. Majority of these requests are from primary care physicians.

Inappropriate referrals reduce the efficiency of the department to diagnose more serious and urgent treatable diseases and hence needs to be addressed.

**Outcomes:** Total number of scrotal ultrasounds studied was 502. The referrals were mainly from the primary care GPs 70% (353) followed by urologist 18% (91) and other departments 12% (58).

Median age was 41 years (Range 10-91 years).

Median waiting time from referral to examination was 19 days (0-80 days).

Common clinical indications were scrotal lump 27%, epididymal cyst 24%, scrotal pain 23%, hydrocele 6%, varicocele 6% and probable malignancy 5%.

Ultrasound findings of these referrals were mainly epididymal cyst 38%, normal 35% and hydrocele in 7%. Malignancy was diagnosed in 3 cases only (Age range 18-44 years).

**Discussion:** Majority of ultrasound findings were normal or benign conditions and performed with poor clinical indications.

Testicular cancer is uncommon after fifth decade.

Robust training of GPs on scrotal diseases management may improve efficiency.

Ultrasound showing an innocent condition can be reassuring for patients, but GP with confident clinical skills can do the same.

#### P-034 **Audit of Down syndrome screening in ultrasound**

*Michelle van Zyl, Vin Majuran*

*Kingston Hospital NHS Trust*

Downs syndrome affects approximately 1:1000 pregnancies in the UK every year. Our maternity department offers women a combined screening test at 11 - 14 weeks, comprising an Ultrasound scan to measure Crown Rump Length (CRL) and Nuchal Translucency (NT), and a maternal blood test. NT is the area of subcutaneous fluid at the back of the neck which is present in all fetuses. Increase in NT thickness can be associated with chromosomal abnormality. Operators must accurately measure NT to improve detection rates and keep false positive rates (FPR) low.

Downs syndrome screening Quality Assurance Support Service (DQASS) monitor NT and CRL measurements. Individual performances are compared to the expected distribution curve and assigned a Green flag (good), Amber flag (satisfactory) or Red flag (needs further training). Fetal Anomaly Screening Programme (FASP) guidelines state that the local Screening Support Sonographer informs all operators of their DQASS flag and reviews images to improve performance. Sonographers were asked to submit 1 CRL image and 3 NT images to be scored against the FASP criteria. Findings were presented.

Prior to the audit (03/2011), 100% sonographers had an Amber flag, and the department had a DR of 76% and FPR of 2.4%. Following the second DQASS cycle (09/2011), the department has 33% Green flags and 66% top Amber with an improved DR of 91% and FPR of 3.4%. (expected DR 83%, FPR 3.4%).

The aim of the audit; to improve antenatal screening, has been achieved, and further image review sessions will commence in April 2012.

#### **Clinical: MSK**

#### P-035 **The paediatric cervical spine: a pictorial review of developmental anomalies**

*Mike Mackenzie; Sandra Monks;*

*Pennine Acute Trust*

Urgent radiological assessment of the paediatric cervical spine can be challenging since there are numerous confusing vertebral manifestation of normal anatomical variations, ossification centres and synchondroses (Fesmire, 2004). More so, the paediatric spine is the location of both congenital and acquired conditions, which presents particular risks to the reviewing advanced practitioner radiographer. Radiological appearances which infrequently occur and offer challenges to emergency and radiology clinicians, such as congenital bony and ligamentous disorders are discussed and pictorially reviewed.

Proficient recall of anatomical variants is paramount for accurate image interpretation. Many cervical variants include anatomical wedging (C3/4), exaggerated predental space, widening of intervertebral spaces, pseudosubluxation, reduced or reversal of cervical lordosis and pseudo fractures are amongst some of the difficult radiological manifestations that clinicians encounter (kilmo, 2007).

Lustrin (2003) and Jeneau (2010) explains that cervical spine trauma in children is typically located in the superior vertebral region owing to the unique biomechanics and anatomy with increased threat of neurologic injury rather than damage to skeletal structures. Kilmo (2007) clarifies that although



serious injuries to the paediatric cervical spine occur infrequently, there are biomechanical features that allow it to significantly flex and extend which presents unfamiliar scenarios in the diagnosis, in comparison with adults.

This presentation will pictorially review and discuss paediatric upper cervical anomalies which can mimic presentations of trauma.

**P-036 Spineanalyser: precision and agreement using dual-energy lateral vertebral assessment scans**

*aren Knapp; Ben Rock; Callum Birch; Susan Hopkins; Sarah Gallimore; Andy Shallcross; University of Exeter; Royal Cornwall Hospital;*

The aim of this study was to evaluate the precision and accuracy of SpineAnalyser software (Optasia Medical) using lateral vertebral assessment (LVA) images acquired on the GE Lunar Prodigy.

LVA images from 64 men, mean age (SD) 58.4y (12.0), mean BMI 29.9kg/m<sup>2</sup> (4.6) were analysed using the standard GE Lunar software, SpineAnalyser, and evaluated by two independent readers using the Genant semi-quantitative scale. The intra-operator vertebral height precision error was calculated using 10 scans analysed 10 times each by one operator.

SpineAnalyser provides a quick and easy method for identifying vertebral fractures from radiographs and other x-ray-based technologies. This study investigates if this software can be applied to dual energy LVA scans from the GE Lunar prodigy.

The percentage agreement between all methods for individual vertebrae (n=573, n fractures=17) ranged from 96 to 98.6%. The best agreement was between GE Lunar and SpineAnalyser quantitative morphometry. The precision results ranged from RMSCV% 0.19 to 7.14% (65 to 90 df) and 2.5 to 3.0% when calculated across all vertebrae (1017 df). T4 was excluded due to the low numbers of scans where this was adequately demonstrated. The best precision was in well-defined thoraco-lumbar vertebrae.

These results demonstrate that SpineAnalyser provides a reproducible method for measuring vertebral height and quantifying vertebral fractures from dual energy LVA scans. The agreement between SpineAnalyser and GE Lunar software is comparable to the agreement between independent readers. SpineAnalyser is a fast reliable method for quantifying vertebral height measurements and identifying vertebral fractures.

**P-037 Schematic presentation of the causes of spinal ankylosis**

*Asimena Mermekli; Alpesh Mistry; Andoni Toms; Radiology Academy, Norfolk and Norwich University Hospital, Norwich*

**Aims/ Objectives:** The objectives are to identify the different types of spinal ankylosis, examining their morphological characteristics and patterns of disease.

**Content:** The following types of ankylosis are presented: degenerative, inflammatory, neuropathic, traumatic and infective. Additionally, less frequent causes are discussed: fluorosis, acromegaly hypoparathyroidism and secondary to medication. Schematic diagrams of the spondyloarthropathies are presented to aid with the differential diagnosis.

**Relevance/Impact :** An outline of the causes, typical appearances and patterns of spinal ankylosis enables a systematic and logical approach to differentiating the diagnoses. This knowledge and enhanced understanding are necessary when reporting plain radiographs of the spine and sacroiliac joints.

**Outcomes:** Osseous spinal excrescences causing ankylosis can be seen in a variety of conditions and can originate from the intervertebral disc or paravertebral structures. Radiographically, some changes are subtle and similar for a number of conditions, whereas others are distinct.

**Discussion:** There are different appearances of the spine and sacroiliac joints depending on the underlying condition. In some cases more than one pathology can co-exist, but usually one is prominent. A discussion on the causes of ankylosis and the distinguishing features are presented.

**P-038 The utility benefit of CT in the imaging of scaphoid injury – no longer a pain in the wrist!**

*Stephen Lyen; Andy Planner;*

*Great Western Hospital, Swindon*

**Aims/Objectives:** The aim of our project was to evaluate patients who underwent CT for suspected scaphoid fracture, assessing their long term outcome and the clinical efficacy of a CT based strategy.

**Content:** 100 patients had CT for suspected scaphoid fracture from May 2008 to Dec 2009. All relevant imaging and electronic casenotes were reviewed over a minimum of 23 months from time of injury. We demonstrate the results of patient follow up including imaging, number of orthopaedic outpatient appointments, clinical diagnoses and management.

**Relevance/Impact:** The optimum diagnostic imaging in scaphoid trauma remains controversial. Occult scaphoid fractures are common in medical malpractice and the burden of patient follow-up can be demanding. CT is attractive as a second line investigation to stratify patients due to its relatively low cost, speed of use and accessibility compared to MRI.

**Outcomes:** Mean time from injury to CT was 23 days. 80/100 CTs were normal. 20/100 showed occult fractures not appreciated on plain film (4 scaphoid, 11 radial, 2 triquetral, 3 trapezium). 4 patients had subsequent imaging (total 3 MRIs, 1 US, 3 scaphoid XR), all were normal. 6 patients with a normal CT had >1 follow-up outpatient appointments for persistent pain, no fractures were subsequently diagnosed. All patients with a normal CT were managed conservatively with no serious complications.

**Discussion:** CT would appear a safe and effective tool for stratifying patients with scaphoid injury and should form part of a departmental imaging algorithm. This potentially has a huge impact in reducing follow-up clinic appointments.

**P-039 Radiography of the acromioclavicular joint**

*Zohaib Yaqub; Sabah Awan;*

*Hull and East Yorkshire Hospitals NHS Trust; Airedale NHS trust;*

Acromioclavicular (AC) joint injuries are generally caused by a direct blow to the shoulder or fall on to an outstretched hand. AC injuries are more prevalent in athletes. Patients with AC injuries present with pain around the AC joint area and reduced range of movement. Following the initial clinical assessment, the patient has a radiographic assessment to confirm the diagnosis.

Antero-posterior view of the shoulder is a routine radiographic projection for patients with suspected AC joint injury. However, there is variation in literature and clinical practice about the secondary projections used from no secondary projection to Zanca, axillary lateral and stress views. This poster aims to improve radiographers' understanding of the the AC joint anatomy and the type of AC joint injuries. Moreover, the poster presents the findings of a systematic literature review performed by two radiographers for literature published between 1970 and 2011 to inform practice of the optimal radiographic projections for diagnosing AC joint injuries.

**P-040 Metatarsalgia - a pictorial review of the various differential diagnoses and their imaging**

*Teik Chooi Oh; Syed Ali; Simon Beardmore; Nitin Ramamurthy; Raj Kumar; Tony McEvoy;*

*Royal Preston Hospital, Lancashire Teaching Hospitals Foundation Trust*

Metatarsalgia is a common forefoot pain problem presenting to clinicians. There is an extensive range of differential diagnosis available and some cases are not very specific from history and clinical examination alone. Imaging plays an important role, ranging from plain x-rays and ultrasound to CT and MRI as well as radionuclide imaging.

We present a pictorial review of the various forefoot pain differentials, using various modalities described above. Diagnoses extend beyond the metatarsals and those shown include soft tissue masses (Morton's neuroma, bursitis, Giant Cell tumours, tendon disorders (including tears and tendinopathies), plantar plate injury, stress fractures, Freiberg's disease, sesamoid pathology

(including fractures and sesamoiditis) various arthropathies as well as the less common soft tissue and bony neoplasms.

Pictorial review will also discuss the various ideal first-line and follow-up imaging modality for each of the diagnoses. This will help the Primary care and Specialist doctors to refer patients for the correct imaging.

**P-041 Neck of femur fracture? or not?**

*Nadeem Butt; Alastair Forrester; Moustafa El-Badawy;  
Hairmyers Hospital, East Kilbride*

**Aims/Objectives:** Hip fracture is a major public health issue due to an ever-increasing aging population. About 70,000-75,000 hip fractures occur each year and annual cost for all UK hip fractures cases is about GBP 2 Billion. Plain film for suspected neck of femur fracture is a common investigation. However, occasionally plain films do not support clinical findings due to either limited sensitivity or other factors. We perform MRI in selected patients to identify plain film occult fractures. This study analyses effectiveness of this protocol.

**Methods:** Radiology information system identified 204 cases of inpatient MRI pelvis, lower limbs and hips since introduction of this algorithm. 80 cases were performed for other indications and were excluded. Another 8 cases were excluded because of inadequate sequences. 116 cases were reviewed.

**Outcome:** 32 (27.5% ) of MRI cases showed occult Neck of femur fracture. Insufficiency fractures, significant soft tissue injuries and pathological fractures constituted 25 (21.5%), 14(12%) and 8(7%) respectively. No abnormality was found in 32 (28%) cases.

**Discussion:** MRI pelvis should be performed on all patients with suspected neck of femur fractures, normal plain films and immobility. Our study demonstrated a large number of cases with occult pelvic and NOF fractures and other abnormal findings despite normal plain films. Identification of such cases contributed positively in management of these patients by timely diagnosis and aiding in treatment planning.

**References:** 'Hip Fracture: The management of hip fractures in adults'. (CG124: National Institute for health and clinical excellence.

**P-042 Effectiveness of intra-articular steroid injection for hip arthritis**

*Nawaraj Subedi; Clare Groves;  
Bradford Teaching Hospitals NHS Trust*

**Background:** Hip osteoarthritis is a common problem. Total hip arthroplasty is the definitive treatment but limited by higher cost and short lifespan of prostheses requiring revision surgeries, and some unfit elderly patients may prefer to avoid surgery altogether. Intra-articular steroid injection is an effective alternative which may help delay/avoid the hip replacement. With this study, we aim to demonstrate the benefits of hip injection across the study cohort with varying degree of disease severity.

**Methodology:**Prospective study of patients attended for fluoroscopic intra-articular steroid injection in our department in 9 months study period. Comparative statistical analysis of Oxford Hip Pain Score pre- and 6-8 weeks post intra-articular injection was performed. Hip radiographs of all patients were categorised as normal, mild, moderate or severe disease (four categories) based on modified Kellegran-Lawrence severity scale and improvement on hip score on each of these disease severity categories was assessed.

**Results:**The cohort of 100 patients comprised M:F ratio of 36:64 with a mean age of 58 years. The mean increase in post procedure hip score of 7.32 points confirms statistically significant benefits of the therapy ( $p < 0.001$ , 95% CI; 5.55- 9.09). No significant difference in pre-injection hip score within and between the four severity categories ( $p = 0.51$ ). Significant improvement in hip score ( $p < 0.05$ ) is demonstrated in each of the four severity categories.

**Conclusion:** This study confirms that intraarticular steroid injection is highly effective therapeutic measure for hip osteoarthritis across all grades of disease severity.

P-043 Now an e-poster

**P-044 Evaluation of ALVAL using US in patients with MoM**

*Teik Chooi Oh; Syed Ali; Simon Beardmore; George McLauchlan; Jeremy Viner; Anas Hatab; Royal Preston Hospital, Lancashire Teaching Hospitals Foundation Trust*

Metal-on-metal (MoM) hip replacements are increasingly common in the past decade but up to 3% experience a complication with aseptic lymphocyte-dominated vasculitis associated lesion (ALVAL). Patients with ALVAL develop a non-specific hip pain which is difficult to diagnose clinically.

Traditionally, the imaging of choice has been Magnetic Resonance Imaging (MRI) but the local streak artefacts from metallic implants can sometimes degrade the image quality and obscure an early ALVAL. Increasingly, our Radiology department evaluates ALVAL queries initially with Ultrasound (US). We have found US to be an effective tool in excluding or confirming ALVAL. In addition, there can be features of adverse reactions to metallic debris (ARMED) such as an echogenic effusion. This along with biochemical markers can help aid in ALVAL.

We present various appearances of ALVAL and other imaging features of adverse reactions to metallic debris on US and MRI.

Accurate diagnosis of ALVAL is important because intraoperative confirmation of chronic inflammation suggestive of ALVAL will necessitate a replacement of the prosthetic component surfaces. By establishing accurate diagnosis of ALVAL using US, we can avoid the more resource-heavy MRI as well as its potential downfalls with local artefacts.

**P-045 Direct GP access for soft tissue lump ultrasound imaging**

*Basavaraj Chari; Sylvia Connolly;*

*Warrington and Halton Hospitals NHS Foundation Trust; St Helens and Knowsley NHS trust; Whiston Hospital, Prescott;*

**Introduction:** Soft tissue lumps and bumps are among the common presenting symptoms in the primary health care sector. Such lumps, bumps, nodules or masses comprise a broad and potentially bewildering array of benign and malignant processes. The origin of these lesions could be cutaneous, subcutaneous, involving muscle or bone and it is a difficult decision at the primary health care level for an appropriate hospital referral for evaluation. The management of such lesions depends upon their nature and the imaging is of paramount.

**Methods:** We performed a retrospective analysis through the radiology information system looking specifically for patients who were referred directly by GP for soft tissue lump ultrasound scanning. The request and report were analysed and demographics, outcome i.e. benign, malignant or inconclusive lesions which proceeded to have further imaging were tabulated.

**Results:** A total of 215 GP referrals were included in the study (93 males, 122 females). The age range was between 1 and 99 years (mean 47.85). Total number of normal scans - 57, benign findings - 139, obviously malignant - 2, indeterminate - 17. Further imaging included - MRI in 15, repeat US in 4, CT in 2 and Plain films in 2 patients. From further imaging, confirmed malignant lesions - 4 (1.86%), benign - 9 and normal studies - 7.

**Conclusion:** Ultrasound is an ideal tool for soft tissue imaging. A direct access given to the primary care sector helps early diagnosis and effective management. It helps increasing diagnostic confidence to the GP and reduces unnecessary patient anxiety.

**Clinical: Neuroradiology**

**P-046 Imaging skull base pathology**

*Uma Viswanathan Nair; Kimberley Lam; R Hanlon; H Lewis-Jones;*

*University Hospital Aintree*

Skull base pathology raises a significant challenge to the clinical Radiologist. The anatomy of the skull base is a complex area and modern imaging techniques utilising CT and MR have made the level of anatomy and detail of the skull base even more complex to interpret.

The aim of this poster is to present a rational method for interpretation of skull base pathology and to illustrate the common pathologies encountered in this area.

We present 15 illustrative cases which demonstrate the link between clinical presentation and the need to inspect the radiological course of specific cranial nerves. We also present the common coincidental findings that do not require clinical intervention and can be misinterpreted as significant pathology.

**P-047 Why are we not out of our skulls?**

*Stephen Lyen; Nicholas Ridley; Mark Hawkins; Ann Jones;  
Great Western Hospital*

**Aims/Objectives:** Following the introduction of NICE head injury guidelines and increasing use of CT, the number of skull radiographs being performed has been steadily decreasing. Nonetheless, requests for skull x-rays are still made. Our aim was to audit the indications, numbers and appropriateness of skull radiographs performed in our department in recent years.

**Content:** We reviewed the indications for skull x-rays over the past year and the total numbers performed over the past 5 years. Accepted Indications include: 1. Craniosynostosis, 2. Skeletal dysplasia, 3. NAI, 4. Foreign body, 5. Intraventricular shunt, 6. Skeletal survey for myeloma, 7. Paget's disease.

**Relevance/Impact:** Despite decreasing numbers of skull radiographs, requests are still made and it is important to ensure we have an understanding of why they are required.

**Outcome:** Review of the past year showed that out of 117 skull radiographs, the most common indications were for Myeloma (47.9%), Craniosynostosis (23.1%), Bony scalp lumps (8.5%) and NAI (6%). Only 2 cases were considered inappropriate, 1 adult trauma and 1 suspected pituitary adenoma.

Over the past 5 years the number of skull radiographs has decreased by approximately 65% (333 to 117).

**Discussion:** Most requests are appropriate as per our criteria. 2 out of 117 could have been avoided. It is debatable if bony lumps are more appropriately assessed with ultrasound/CT instead of plain film. It is likely that a small number of skull radiograph requests will persist, particularly in the paediatric population and for myeloma patients. Regular audit will ensure these requests remain appropriate.

**P-048 "it's all in the head!"-neuroradiological manifestations of systemic disease**

*Amarjot Chander; Kumar Das;*

*Walton Centre for Neurology and Neurosurgery; The Walton Centre NHS Foundation Trust, Liverpool,*

**Key Learning Objectives:** To recognise the varied neuroradiological appearances of systemic diseases. To consider systemic disease in the differential diagnosis for neurological symptoms. To highlight the importance of knowing relevant past medical history when interpreting radiological investigations.

**Background:** Systemic diseases can manifest in many different ways. In the context of a known condition, it is always important to consider this as an underlying cause for neurological symptoms. It is essential for clinicians to provide accurate and relevant information about past medical history, to enable the correct study to be performed and allow full interpretation of neuroradiological findings.

**Imaging Findings:** Pictorial review illustrating 8 examples of neuroradiological manifestations of systemic disease including sarcoidosis, paraneoplastic syndromes and HIV. Clinical scenarios are given with each example.

The importance of relevant clinical history is emphasised.

**Conclusion:** Neuroradiological change due to systemic disease is an important differential to consider when investigating neurological symptoms and signs.

Knowledge of relevant past medical history is key to interpretation of radiological investigations.

P-049 **Service evaluation of subdural electrode and grid placement**

*Jennifer Larsen; Thomas Manship; Ian Craven; Daniel Connolly; Dev Bhattacharyya; Ruth Batty;*

*Sheffield Teaching Hospitals; The Neuroradiology Department, The Royal Hallamshire Hospital, Sheffield.*

**Aims:** Service evaluation of current practice and complication rates of subdural electrode/grid placement prior to epilepsy surgery in a single centre.

**Methods:** Standards were devised: Patients must have medically resistant epilepsy and be a surgical candidate (100%). There should be discrepant semiology, EEG and MR findings regarding the epileptogenic focus (100%). There should be no complications (0%). Management should be affected (100%).

All patients with electrode/grid placement prior to epilepsy surgery between 2005 and 2008 were included. Data was collected on a proforma detailing: demographics, medication, semiology, MR and EEG findings, complications and whether or not management was affected.

**Results:** 14 patients were identified. Data was available in 11. Median age was 46 years. 91% had drug refractory focal epilepsy. 100% had non-concordance of EEG, semiology and MR findings. 36.4% had an abnormality in an eloquent area. Placement influenced management in 91%. 5 patients had no follow up imaging. 3 had post-operative imaging but no post grid / electrode placement imaging. 3 patients had imaging pre-operatively post grid / electrode placement and 1 out of the 3 had a clinical complication with imaging changes (abscess).

**Conclusions:** All patients undergoing subdural grid / electrode placement should be surgical candidates and the results should directly influence management.

Magnetic resonance imaging should be performed on all patients' pre- and post- electrode/grid insertion and post surgery.

Closing the audit loop with a larger population is needed to accurately verify the complication rate.

P-050 **Urgent MRI for spinal cord compression and the quality of referral at Luton and Dunstable Hospital**

*Mohammed Malik; Kumar Subramanian;*  
*Luton and Dunstable NHS Foundation Trust*

**Background:** Acute spinal cord compression is a neurosurgical emergency accounting for 4000 cases every year in England and Wales<sup>1</sup>.

**Gold standards:** NICE guidelines suggest that any patient with a suspected metastatic cord compression should undergo MRI of the whole spine within 24 hours and the clinical indicators are<sup>1</sup>:

- Radicular pain
- Any limb weakness
- Difficulty in walking
- Sensory loss
- Bladder or bowel dysfunction
- Neurological signs of spinal cord or cauda equine syndrome

**Set standards:** All the patients with suspected spinal cord compression should have their MRI scan done within 24 hours.

**Methodology:** A list of patients who underwent urgent MRI for suspected spinal cord compression between October 2010-March 2011 was generated. A random selection of 62 patients was done.

**Results:** 74% patients had their scan done within 24 hrs. However, 92% patients had their scans done within 28 hrs, with only 8% patients having their scan done after 28 hrs.

All the patients with positive scans had good referral indicators.

Seniors had higher number of negative scans with poor clinical indicator in comparison to juniors.

**Comparison with set standards and Discussion:** Luton and Dunstable Hospital performance is excellent. Both senior and junior staff sent in referrals which did not comply with the gold standards.

The proposed action points from the audit are:

- Patient must be reviewed by a senior doctor, documenting clearly the patient's symptoms, signs and suspected diagnosis on the request form.
- Strict adherence to the referral criteria on the part of the radiologist vetting the request for the scan.

#### References :

<sup>1</sup> Metastatic spinal cord compression. Nice Guidelines (accessed 20 Sept 2011).

<http://guidance.nice.org.uk/CG75>.

### Clinical: Head and neck

#### P-051 Midface fractures explained

*David Minks; Wendy Matthews*

*Leeds Radiology Academy; Leeds General Infirmary;*

**Introduction:** Registrars beginning on-call duties may be inexperienced diagnosing and reporting craniofacial trauma. 71.5% of facial fractures affect the midface. Computed tomography is increasingly used over conventional radiographs in trauma imaging. Frequently, fractures to the midface are detected incidentally by the radiologist on a CT requested for neurological purposes. Here, prompt referral to the appropriate surgical discipline is imperative in optimising functional and aesthetic repair.

This poster explains the anatomy of the facial buttresses and describes characteristic fracture patterns affecting the midface, along with relevant management options. This will aid the radiologist in determining clinical importance during reporting or referral.

**Method:** The anatomy of the facial buttresses is explained diagrammatically and various imaging modalities employed to illustrate fracture patterns. This poster explains patterns and grading of the following injuries:

- Nasal and nasoethmoid fractures
- Zygomatic arch fractures
- Zygomatico-maxillary complex fractures
- Orbital floor fractures
- Le-Fort classification

**Results:** Imaging examples are used to explain these complex injuries, with advice on how to concisely classify them on report, avoiding common pitfalls.

**Discussion:** Early and accurate assessment and description of complex midface fractures can help the surgeon prevent functional impairment and cosmetic deformity. An understanding of the facial buttresses and their common fracture patterns allows the radiologist to more accurately inform the surgeon of injuries present.

#### P-052 Radiological anthropometric assessment of cervical neurovascular structures to explosive fragmentation

*John Breeze; Andrew West; Jon Clasper;*

*Royal Centre for Defence Medicine*

42% of explosive cervical wounds are fatal, due to either vascular or spinal cord trauma. The aim of this paper was to determine military specific cervical neurovascular and external anthropomorphic

data. This will be used to scale future numerical injury models of the neck and improve body armour design with a view to prevention or mitigation of combat neck injury.

Contrast enhanced CT angiograms of 50 UK servicemen were analysed. Mean diameters and distances from the skin surface were determined for the carotid artery (CA), internal jugular vein (IJV), vertebral artery (VA) and spinal cord (SC) at the three surgical neck zones. Horizontal neck circumference at C6 and three potential vertical cervical anthropomorphic measurements were analysed for intra-variability.

The diameter of cervical vascular structures are greater and the vessels more superficial as the anatomical plane moves caudally. The SC and VA are better protected than the IJV and CA due to their greater depth and bony coverage, except for the VA in Zone 1.

Future cervical anthropomorphic assessments should use the vertical angle of mandible to mid-clavicular distance in combination with the horizontal neck circumference as these demonstrated the least variability. Cervical neurovascular structures are least vulnerable postero-superiorly and therefore extending the posterior aspect of a ballistic helmet inferiorly or adding a nape protector would appear to be less justified. Cervical vessels are most vulnerable in Zone 1 and a circumferential collar of ballistic material at least 75mm high would cover this area in 95% of this population.

#### P-053 **Branchial cleft anomalies: a complete guide**

*Dushyant Shetty; Patrick Rogers; Ben Rock; Simon Thorogood;  
Royal Cornwall NHS Trust*

**Aim/ Objectives:** Branchial cleft anomalies comprise of a spectrum of congenital defects that occur in the head and neck. These can result in cyst, fistula or sinus formation. This presentation is a multi-modality demonstration of the four branchial cleft anomalies.

**Content :** Branchial cleft anomalies result from branchial apparatus, embryologic precursors which form arches that give rise to anomalous clefts. They typically appear as fluctuant neck masses that can become symptomatic.

Second branchial cleft anomalies are the most common by far. This presentation is a case based demonstration of the classical radiological appearances of all four branchial cleft anomalies on ultrasound, CT and MRI.

**Discussion** Major teaching points are;

- Branchial cleft anomalies are important entities to recognise, as surgical resection is curative.
- It is essential for radiologists to understand the embryological derivation of such anomalies and appreciate their appearances as imaging, be it ultrasound, CT or MRI, is key to diagnosis.

#### P-054 **An audit into the use of occipitomeatal radiographs in the diagnosis of zygomatic fractures**

*Wendy Matthews; David Minks;  
Leeds General Infirmary; Leeds Radiology Academy;*

**Introduction:** A set of 2 occipitomeatal radiographs at 10 and 30 degrees are used to diagnose a clinically suspected fractured zygoma. The art of diagnosing a fractured zygomatic complex from radiographs is one which demands experience on behalf of the clinician. There are no current guidelines to standardise imaging requests in this field.

This audit aimed to examine requests for occipitomeatal radiographs from an Accident and Emergency department to elicit the findings upon examination which prompted imaging requests. It also measured the proportion of radiographs which proved diagnostic of a fracture.

**Method:** A sample of 200 notes of patients who were admitted to Dewsbury District Hospital A&E and had occipitomeatal views taken to aid diagnosis of a fractured zygoma were reviewed retrospectively.



**Results:** The most common mechanism of injury was alleged assault 47%. Fractures were detected in 4%. Less than 1% of patients undergoing X-ray underwent corrective surgery. A wide range of signs were recorded, however only three signs were found in fractured zygomatic complex cases: alteration in sensation in the trigeminal nerve infraorbital division, flattening to the mid face and a palpable step deformity.

**Discussion:** The West Yorkshire Comprehensive Local Research Network are taking the project further as a prospective study with HLA funding with the aim to elicit a link between signs significantly present in cases of fractured zygomas. If a link is found, guidelines could be devised to aid the clinician in requesting imaging in the case of a fractured zygoma.

**P-055 MRI of parenchymal brain lesions in behcet's disease**

*Sundip Udani; Amruta Talwalkar; Ahmed Ismail;*

*NHS Northwest; Wrightington Wigan and Leigh NHS Trust;*

**Aims/ Objectives:** To present the MR imaging features of different patterns of brain tissue involvement in Behcet's disease and discuss the main differential diagnoses.

**Content:** We report three cases of the relatively rare Neuro-Behcet's disease affecting the brain parenchyma and discuss the temporal changes and the main differential diagnoses of MRI finding in such cases with review of related literature.

**Relevance/Impact:** Awareness of the key MR imaging features of such a disease will help radiologists avoid misinterpretations that alter patients' management.

**Discussion:** Parenchymal brain involvement in Behcet's disease is rare. Brain MRI, particularly DWI, shows the different patterns and temporal changes of brain lesions and help differentiating neuro-behcet's disease from other disease entities of similar predilection to the mesodiencephalic structures such as ischemia, carbon monoxide (CO) and methanol toxicity, infection and diabetic uraemia.

### Clinical: general

**P-056 Hip surveillance in cerebral palsy: what the general radiologist needs to know**

*Emily White; Yousef Alwan; Kate McMonnies; Suraj Amonkar;*

*North Manchester General Hospital, Pennine Acute Hospitals NHS Trust*

**Objectives:** To illustrate by way of pictorial review how to calculate hip migration percentage and acetabular index on a pelvic radiograph in patients with cerebral palsy. A knowledge of the relevant lines and angles is necessary and this poster will demonstrate these in the accompanying pelvic radiographs.

**Content:** As part of the hip surveillance pathway for children with cerebral palsy in our region, pelvic radiographs are performed to monitor hip deformity and subluxation, as it can have an impact on the long term management of patients.

We audited the reports of pelvic radiographs performed over a 12 month period in a multisite NHS Trust to determine whether adequate information was being provided.

**Relevance:** Patients with cerebral palsy are at risk of developing gradual hip deformity and subluxation as part of the natural course of their condition. Early detection can identify the need for appropriate orthopaedic intervention. The information provided in the radiology report is central to this.

**Outcomes:** In the cases included in our audit, we found that the majority of reports were generic. This highlights the need for further education about the adequate assessment of pelvic radiographs in children with cerebral palsy.

**Discussion:** Providing detailed information is relatively simple using a digital radiograph; we aim to demonstrate for the general radiologist the simplicity of measuring hip migration percentage and acetabular index. As a result, paediatricians and orthopaedic surgeons will be better equipped to manage these patients, who often have complex needs.

P-057 **18F-FDG PET-CT in the management of unknown primary head and neck malignancy**

*Luke Sonoda; Ambika Chadha; Bhavin Visavadia; Wai Lup Wong;  
Mount Vernon Hospital*

**Aim:** The aim of this study was to assess the value of 18F-fluorodeoxyglucose positron emission tomography computed tomography (PET-CT) in patients with squamous cell and undifferentiated cancer neck nodes and no primary site on conventional assessment.

**Method:** 78 patients with neck nodal metastases from an unknown primary cancer were studied. PET-CT was performed in all patients, 1-hour post FDG injection.

**Results:** Uptake suspicious of an occult primary cancer was found in 46/78 (59.0%) patients. Subsequent investigations confirmed a primary site in the base of tongue in 14, pharyngeal palatine tonsil 14, post cricoid 1, lung 1. PET-CT diagnosed primary cancers in 30/78 patients (38.5%); sensitivity, specificity, PPV, NPV, 30/30 (100.0%), 32/48 (66.7%), 30/46 (65.2%), 32/32 (100.0%) respectively. PET-CT detected additional disease in 4 patients: contralateral nodal disease 2, mediastinal nodal disease 1, and liver metastases 1.

**Conclusions:** 18F-FDG PET-CT is of value in the assessment of patients with occult head and neck primary cancers. However, false positive results remain a limitation of the investigation.

P-058 **Where's the gonad shield? - a trust-wide audit of gonad shield use in paediatric pelvic radiographs**

*Kate McMonnies; Suraj Amonkar;*

*Pennine Acute Hospitals NHS Trust; North Manchester General Hospital*

**Aims/Objectives:** To re-iterate the importance of using gonad shielding in paediatric pelvic radiographs, share the results of our audit, discuss why usage varies and how it can be improved.

**Content :** We conducted a retrospective audit based on data from four hospitals. All paediatric pelvic radiographs performed within a one-year period were assessed for the presence and correct placement of a gonad shield. In total, 997 films were reviewed in the study. We will also illustrate how and where they should be placed.

**Relevance/Impact:** The gonads are deemed to be the most radiosensitive organs in the body. Gonad shields are readily available yet there is little guidance indicating when they should be utilised; literature suggests that use in the first radiograph is not essential, but that for follow up (e.g. for Perthes disease, slipped capital femoral epiphyses) they should be used.

**Outcomes:** 109 (11%) of all the radiographs had a shield; of these 9% were on the first radiograph. 118 radiographs were follow-ups; in this subgroup, gonad shields were used in 25 radiographs (22%). Of these, they were correctly placed in 11 radiographs (9%).

**Conclusion:** Our suspicion that usage of shields could be improved was founded; discussion with other hospitals in the region found similar issues. Gonad shield usage can be improved; this can be done by reiterating how to correctly place them and clarifying in what scenarios they should be used; we believe that at the very least, this should be in follow up non-trauma radiographs.

P-059 **FDG PET/CT and paraneoplastic neurological syndrome**

*Shahriar Islam; Norbert Avril; Teresa Szyszko;*

*PET Imaging Centre, St. Bartholomew's Hospital, London*

**Introduction:** Paraneoplastic neurological syndromes (PNS) are a group of central nervous system disorders associated with cancer and onconeural antibodies, suggesting that they are immune mediated. The aim was to establish the incidence of positive scans for occult malignancy within the context of referrals for PET/CT made for possible paraneoplastic syndrome.

**Methods:** This was a retrospective audit of FDG PET/CT scans performed at St Bartholomew's hospital from February 2006– October 2011, where the clinical history provided was “?

Paraneoplastic". There were 26 patients (16 female) aged 21-81 (mean 56). Antibody status was checked using the "electronic patient record" database.

**Results:** In 4/26 patients (15%) – the FDG PET/CT scan identified possible occult malignancy. 3/26 (12%) were histologically proven. 7/26 patients had no previous imaging, 18/26 had MRI brain +/- spine, and only 1/26 had a previous full body CT to exclude malignancy. Of the 22 negative PET scans 11/22 had no evidence of malignancy on future imaging, 11/22 had no further imaging. 7/26 (27%) had antibody testing, with 3/4 patients with positive PET/CT scans testing positive.

**Discussion:** FDG PET/CT has a high sensitivity for detecting occult disease and is hence a useful screening test in the investigation of patients with paraneoplastic syndrome. This audit highlights the referral needs to be more detailed and less than 1/3 of patients had onconeural antibody analysis performed prior to the PET/CT study, thus perhaps we should only perform PET/CT when onconeural antibodies have been performed and there is a strong clinical suspicion of PNS.

#### P-060 **An audit of GP paediatric ultrasound requests**

*Gibran Timothy Yusuf, Pamela Allen;  
King's College Hospital*

**Aims:** To evaluate validity, volume and type GP paediatric ultrasound requests.

**Content :** Four months of GP paediatric ultrasound requests audited. The number and type of requests were examined to see if they were indicated according to "Making Best Use of Radiology (MBUR)" guidelines. The ultrasound findings and pathology pick-up rate was also analysed.

**Relevance:** There are numerous paediatric ultrasound requests and paediatric clinic referral is encouraged for complex/chronic pathology prior to ultrasound. Clinical information provided is often limited, based on this many are inappropriate. Investigation may induce anxiety in parents or potentially delay diagnosis in absence of findings. Additionally inappropriate requests prolong waiting lists and increase costs, minimising unwarranted requests is necessary.

**Outcomes:** 219 scans in a tertiary centre were analysed. 2/3 of requests were warranted via MBUR. Testes, soft tissue and neck ultrasounds were most frequently indicated. Foot, spine and kidney scans were least indicated. 2/3 of scans had no abnormality and 2/3 were unable to explain symptoms. Utilising MBUR criteria increased detection of significant abnormalities by 71%.

**Discussion:** Renal ultrasounds have a low abnormality detection rate and may be falsely reassuring, explaining why paediatric clinic assessment is suggested. MBUR is a useful guidance tool for improving detection. However, ultrasound is an adjunct to clinical examination rather than replacement. When performing scans it was found GP's were not examining correct creases when assessing hips and unaware of concerning features for sacral dimples or lymphadenopathy. A joint meeting with GP's and paediatricians was conducted to advise on MBUR

#### P-061 **Accuracy of PET-CT in nodal staging of oesophageal adenocarcinoma**

*Cindy Leung; Vetri Sudar Jayaprakasam; John Rees; Patrick Fielding;  
Cardiff and Vale University Health Board*

**Aim:** The aim of the study was to review the correlation of oesophageal adenocarcinoma nodal disease on PET-CT and histology, taking into account factors such as neoadjuvant chemotherapy and duration between imaging and surgery.

**Method:** We retrospectively reviewed all PET-CT performed for biopsy-proven oesophageal adenocarcinoma between September 2010 and September 2011. Data collected included PET-CT nodal staging and their maximum standardised uptake value (SUV max), date of surgery, neoadjuvant chemotherapy and time from PET-CT to surgery.

**Results:** During the study period, 75 oesophageal adenocarcinoma patients underwent PET-CT for biopsy-proven oesophageal adenocarcinoma. The demographic distribution is 66 male and 12 female, with an average age of 64 years. PET-CT nodal status was accurate in those who received no neoadjuvant chemotherapy and proceeded to surgery within four weeks. PET-CT accurately

demonstrated the nodal status in almost half of two patient groups, 1) patients who received neoadjuvant chemotherapy prior to surgery, and 2) those had no neoadjuvant chemotherapy prior to surgery. Nodal staging is histologically up-staged and down-staged in equal proportion in the remaining patients. PET-CT failed to show any focal FDG uptake in the primary tumour in four patients, one of whom had positive lymph nodes at surgery after 47 days of imaging.

**Conclusion:** Although oesophageal adenocarcinomas are known to have low grade FDG uptake, the nodal accuracy is not affected if surgery is performed soon after the PET-CT imaging. Factors such as neoadjuvant chemotherapy and prolonged (> four weeks) duration between imaging and surgery alter the accuracy of nodal status.

**P-062 The added benefit of using SPECT/CT with sestamibi over the sestamibi- pertechnetate subtraction scan, with histo-pathological correlation**

*Sarena Virdee; Randeep Kulshrestha; Lipika Tandon;*

*Lancashire Teaching Hospitals NHS Trust; North Manchester General Hospital;*

**Objectives:** Parathyroid pathology has traditionally been investigated using MIBI-pertechnetate subtraction planar imaging. The primary purpose of this study is to validate the use of SPECT/CT in the detection of parathyroid disease by patho-radiological correlation. The second purpose is to compare both techniques mentioned above and their ability to detect parathyroid disease.

**Methods:** 206 patients who have had parathyroid imaging were identified retrospectively. 102 of these patients underwent MIBI-pertechnetate subtraction planar imaging. 104 patients underwent imaging with SPECT/CT. The radiological reports of these techniques were analyzed and recorded. 76 patients underwent surgical excision and therefore had histo-pathological data. Radiological data was compared with histo-pathological specimen results and the subsequent information analyzed statistical tools.

**Results:** Out of 41 patients who had planar subtraction imaging, 27 had radiotracer uptake and subsequent positive histo-pathological confirmation. Two patients had no uptake on planar subtraction imaging, confirmed with negative histopathology. The number of false positives and false negatives were four and eight respectively. In contrast, out of the 35 patients undergoing SPECT/CT, 33 had radioisotope uptake which was confirmed histo-pathologically. One patient was found to have no uptake on SPECT/CT and also histo-pathologically negative. Finally, there was only one false positive in the SPECT/CT cohort of patients.

	<b>SENSITIVITY (%)</b>	<b>SPECIFICITY (%)</b>	<b>ACCURACY (%)</b>	<b>PPV/NPV (%)</b>
<b>SUBTRACTION IMAGING</b>	<b>77.1</b>	<b>33.3</b>	<b>70.7</b>	<b>87.1/20</b>
<b>SPECT/CT</b>	<b>100</b>	<b>50</b>	<b>97.1</b>	<b>100/97.1</b>

**Conclusions:** SPECT/CT has shown a clear improvement in identifying histologically positive and negative disease in relation to radiotracer uptake. This is confirmed by the high positive and negative predictive values. Furthermore, this technique has found to be more sensitive, specific, and accurate when compared to conventional planar subtraction imaging.

**P-063 A holistic approach to improving the claustrophobic patient's experience in an MRI unit**

*Janet Dark, InHealth Limited*

Our aim was to ensure a consistently high level of care, for every patient, for every scan, within the setting of a new MRI unit with two state of the art scanners. One scanner is an "Open" MRI, particularly useful for claustrophobic, bariatric, paediatric, and special needs patients.

We used the opportunity of the redesign of the unit to investigate and implement a variety of holistic techniques aimed at improving the claustrophobic patient experience and compliance for MRI scanning. We considered all sensory stimuli and communication methods. Our chosen

approaches included neuro-lingistic programming, developing rapport, aromatherapy, ergonomics and spatial design, including feng shui principles. Following their scan, all patients were asked for their feedback on the holistic approach.

98% of patients reported that they felt that the MRI team empathised with their levels of anxiety, therefore reducing them. Although 10% of the patients surveyed had previously attempted and failed to complete their MRI scan, all but 2 concluded their scan successfully on the open MRI after the new approach was adopted.

This suggests that holistic techniques are useful, even subtle or subliminal ones, in making the MRI scan experience more comfortable and successful. We have found that our holistic approach enhances the patient experience and in turn improves our service quality. As with so many innovations in service delivery that are initiated by addressing the specific needs of a minority of patients, all of our service users have benefited as a result.

**P-064 A pilot study investigating the long-term effects on function, bone mineral density and lean tissue mass post fracture in a female postmenopausal population**

*Susan Hopkins; Chris Smith; Andrew Toms; Mary Brown; Joanne Welsman; Karen Knapp; University of Exeter; College of Engineering, Mathematics and Physical Sciences, University of Exeter; Princess Elizabeth Orthopaedic Centre, Royal Devon and Exeter Hospital;*

**Aim:** To investigate long-term outcomes of lower-limb fracture in a post-menopausal population.

**Relevance:** Disuse osteopenia has been reported as a long-term consequence of complicated lower limb fracture [1]. This study investigates the effects of lower-limb fracture and immobilisation on a range of physiological and functional parameters. Thirteen postmenopausal women were recruited who had sustained a lower-limb fracture (excluding hip fracture) between 1 and 10 years ago (mean 3.5 yrs) and during the post-menopausal period. The results were compared to 45 postmenopausal controls. Lower limb function and activity were recorded and bone mineral density (BMD) and lean tissue mass measured using DXA (GE Lunar Prodigy).

**Outcomes:** The fracture group had significantly lower pedometer readings of 6006 steps v's 9752 steps ( $p < 0.001$ ) for controls. Lower limb function scores were 58.3/80 v's 72.7/80 for the fracture group and controls respectively ( $p < 0.001$ ). The fracture group had reduced BMD measurements compared to the control group, but no difference in lower limb lean tissue mass was found between the groups. No significant differences were found between the ipsi- and contra-lateral BMD measurements at the hip in the long-term fracture group.

**Discussion:** These results demonstrate a long-term impairment in lower-limb function and activity post lower-limb fracture in postmenopausal women. Lower BMD results in the fracture group suggest that reduced BMD is likely to play a role in the occurrence of these lower-limb fractures but no significant long-term differences in ipsi- and contra-lateral BMD at the hip are apparent post fracture.

[1] Knapp KM et al. CSM, 2010: 629020

**P-065 Characteristics of prevalent round breast cancers**

*Michael Crotch-Harvey, East Cheshire NHS Trust*

**Introduction:** The revised NHSBSP standards for cancer detection rates in the prevalent round are challenging. Meeting these standards will be even more problematic following the age extension of the screening programme, as there will in effect be two 'prevalent' rounds. In an attempt to improve our cancer detection rate, without increasing recall rates, a retrospective study of cancers detected in the appropriate age range was undertaken.

**Methods:** All breast cancers diagnosed between Jan. 2009 and Mar. 2011 were reviewed and women aged between 46 and 52 at time of diagnosis were identified. Histological and radiological features were recorded. These features were then compared with a previous audit encompassing all age groups.

**Results:** Ninety cancers were identified in 85 women, evenly distributed between symptomatic and screen detected. In comparison to other age groups, tumour size was relatively small and there was a high proportion of DCIS. A dense mammographic background was noted in 42% of cases. Masses and microcalcifications were the predominant radiological abnormalities. Of the 14 cancers equal to or less than 15mm, irregular masses associated with microcalcification comprised 50%.

**Conclusion:** In this age group malignancies are most often manifested by irregular masses, microcalcifications or a combination of both. The introduction of digital mammography will be helpful in the dense breast and in the detection of microcalcifications but there is evidence that small masses are less well seen. Optimising software algorithms for such abnormalities in this group will therefore be important.

#### P-066 **Lung cancers with rare paraneoplastic phenomena**

*Adefolake Yusuff; Rania Romanidou; Toba Obafemi; Vedamurthy Adhiyaman;  
Glan Clwyd Hospital, Bodelwyddan, Wales*

**Aim:** To highlight two rare cases of Paraneoplastic manifestations of lung cancer

**Case 1:** A 65year old gentleman who presented in the Accident and Emergency department drowsy. Finger prick blood sugar was low and laboratory test confirmed a blood sugar of 1.9mmol/L. He was a known case of mesothelioma. Serum C-peptide and insulin were normal, and insulin-like growth factor level was elevated. He was managed with regular intravenous glucose and glucagon during hypoglycaemic attacks.

**Case 2:** A 74year old man, known bronchogenic lung cancer on palliative radiotherapy. He presented with unsteady gait. Examination revealed cerebellar signs, and brain imaging did not provide the a diagnosis for this. However admitting blood showed an eosinophil count of 26.64. Previous blood test showed a gradual increase in eosinophils. Immunochemistry was negative for autoantibodies. He had a trial of steroids which did not improve his neurological symptoms or eosinophils.

**Outcome:** the patients in both cases died within 6months of these symptoms. No described treatment for both cases.

**Discussion:** Paraneoplastic syndromes are due to production of chemokines by the tumor cells or generation of antibodies against the tumor which cross with normal cells. They do not represent metastasis.

Commonly described associations with lung cancers are Lambert Eaton myasthenic syndrome, Cushing's syndrome, Hypercalcaemia.

Both hypoglycaemia and eosinophilia are known but rarely reported and indicate a poor prognosis. No treatment is described but usually directed at the underlying tumor for which both cases were palliative.

Immune modulation is reserved for those with positive autoantibodies eg anti-Ri, Hu, Yo.

#### P-067 **Role of diagnosis and staging in the management of lung adenocarcinoma**

*Sadagat Ali, Kingston University and St. George's University of London*

Lung cancer is the leading cause of cancer related mortality worldwide. Adenocarcinoma is a subtype of non-small cell lung cancer and its frequency is increasing rapidly as compared to squamous cell carcinoma to become the most common subtype of non-small cell lung cancer. Comprehensive literature review is conducted to evaluate role of diagnosis and staging in the management of lung adenocarcinoma. Patient history, physical examination, laboratory tests, histology and imaging plays vital role in the diagnostic evaluation, staging work-up and metastatic assessment of patients with suspected lung adenocarcinoma. Treatment and prognosis are determined through diagnosis and staging of disease spread. For an early stage, surgery is the preferred method of treatment whereas for advanced disease a multi-modality approach is adapted including, chemotherapy and radiotherapy. Diagnostic imaging in conjunction with clinical and physiological assessment helps to identify tumour at an early stage which in turns effects the treatment planning. PET-CT scanning along with mediastinoscopy and biopsy determines the most

accurate staging of lung adenocarcinoma. This staging is very critical portion of the disease management because patient outcome depends upon stage adapted therapeutic strategy. Even a small change in the staging (e.g. IIIA to IIIB) can significantly alter the treatment selection. Therefore, the choice of imaging modalities and other methods of patient assessment for diagnosis and staging require careful consideration and evaluation before employment. Further developments in the assessment technology are very promising and will further improve the accuracy of diagnosis and staging which in turn will facilitate better patient management.

## Imaging Informatics

### P-068 **Audit on GP requests for USS abdomen in which an abnormality is found**

*Girish Rangaswamy, Andrew Edwards;*

*County Durham and Darlington NHS Trust; Eastbourne District General Hospital; Royal Cornwall Hospital NHS Trust;*

**Introduction:** 1) % of GP requests in which an clinically relevant abnormality is found of USS abdomen scan should be no less that that from outpatient requests.

2) Open access to GP's should be provided if requests from GP's yield as many abnormal results as those from hospital doctors from out patient clinic. If not it may be necessary to agree new guidelines.

**Methods:** A retrospective study of randomly selected sample of 100 GP and 100 OP requests over a period of 6 months. Data collection with the help of PACS system. All Inpatient/follow up/ surveillance scan requests were not included.

**Results:** 45% of GP referrals had relevant abnormal findings, 38% of OP requests had relevant abnormal findings on USS abdominal scan. 95% of USS requests were done by ultrasonographers.

**Conclusion:** To continue with current protocol of providing open access for USS requests to GP's. Feedback forwarded to GP's and OP's doctors with copy of audit results. Plan to re-audit in 12 months. Importance of Ultrasonographers in cutting down workload of consultant radiologists.

### P-069 **Communication of urgent and significant radiological findings**

*Ramya Thiagarajah, Peninsula Radiology Academy*

**Aims/ Objectives:** To assess the standard of communication of urgent and significant radiological findings in our department against the expectations of our referring hospital clinical colleagues.

Content of Presentation: Introduction, Method, Survey Questions & Results, Conclusion

**Relevance/Impact:** Communication of urgent and significant radiological findings is an important issue which continues to be an area of concern, as evidenced by several recent published articles. One of the continuing hot buttons is results of urgent and significant clinical findings slipping through the cracks with a failure of the Radiologist to communicate the results to the Referring Clinician (Yee 2010, Berlin 2011).

**Outcomes/ Discussion:** The 100% Target recommended by the RCR was not achieved.

The survey does however reflect positively on the current service provided and the results are in line with a previous referrer satisfaction audit that was completed in our department in 2011.

It also highlighted areas of concern and possible room for improvement, which can be discussed further at the next departmental managerial meeting.

### P-070 **IRMER regulations: compliance rate of radiograph reporting by non-radiology clinicians**

*Rachel Dixon; Usman Mahay; James O'Connor; Tom Newton;*

*Royal Blackburn Hospital; University of Manchester;*

**Aims/objectives:** To determine the compliance with the IRMER 2000 regulation 7(8) - that all radiographic exposures require clinical evaluation to be recorded - for radiographs reported by non-radiology clinicians.

**Content:** Many NHS Hospital Trusts have poor compliance with the IRMER 2000 regulations. This study presents a re-audit carried out in a large district general hospital to determine the percentage of radiographs with a report documented in the notes by non-radiology clinicians. It compares results with a previous audit published in 2010. **Relevance/impact:** In July 2011, the Care Quality Commission issued a directive requiring all NHS Hospital Trusts requiring them to audit compliance with IRMER 2000 legislation, with agreed initiatives and timescales for improving conformity.

**Outcomes:** Following clinician education using “message of the day” and induction lectures, the re-audit showed that there had been an improvement in the documentation of radiographs by clinicians from 53% to 77%.

**Discussion:** Increased workloads in radiology departments have led many NHS Trusts to assign responsibility for evaluating and documenting requested radiographs from the Radiology Department to requesting clinicians. This audit shows that while documentation rates have increased substantially, there is still need for improvement. We will use these results to further educate the referring clinical teams and plan to pilot a results sticker system, which will require clinicians to document the result of the radiograph. Further re-audit will be carried out in 18 months.

**P-071 CT reporting audit- answering the clinical question and assessing the quality of reports**

*Vishal Bhalla, Biju Thomas*

*University Hospital North Staffordshire, Stoke-on-Trent*

**Aims:** To evaluate the quality of body radiology reports.

To determine if and when clinical questions were posed, whether or not they were answered.

**Content:** Based on the Royal College Guidelines, local standards were set. Using a constructed proforma, 102 CT reports were retrospectively studied over a 2-month period to assess local practice. All reports/referrers were kept anonymous. The results were graphically distributed and analysed to determine the cause of any discrepancies or failures to reach the standards.

**Relevance:** In 2006 the RCR released a report summarising reporting standards, highlighting the importance of clear concise reports; displaying a close relationship between the structure of reports and their accuracy.

**Outcomes:** A high quality of reporting standards were demonstrated. 20% of requests failed to pose a clinical question, which hindered the effectiveness of the radiological report and its assistance to the patient and team. A smaller percentage of reports failed to have a conclusion, affecting its overall structure, however these were directly related to a lack of clinical history and question.

**Discussion:** Radiological reports carry the importance of medico-legal implications and rely heavily on the clinical information given in the request. It is a vital form of communication and often incorporates advice for further management or investigations in order to pinpoint a diagnosis.

Our trust has now developed a computer-assisted request service which highlights the importance of clinical questions for reports to answer. In addition referring to a uniformly adopted reporting template could provide more structure and hence accuracy to the reports.

**P-072 The impact of implementing digital imaging in a breast screening service**

*Nicola Gosling, Julie Bower*

*Royal Bolton Hospital NHS Foundation Trust*

**Aims/ Objectives:** The aim is to identify the processes involved in the implementation of digital imaging within a breast screening service at static and satellite sites. The advantages and limitations of digital imaging within the breast screening environment will also be considered. The poster aims to discuss the duties of a PACS administrator.

**Content:** The poster will critically evaluate direct digital mammography equipment and its integration with the PACS, CRIS and NBSS systems and how this impacts upon working processes. A demonstration of how the network effectively interlinks with all these systems will be provided. The



newly established role of PACS administrator within the breast screening service and how they maintain the systems efficiently will be outlined.

**Relevance Impact:** Breast screening services have been advised by The Department of Health that when replacing equipment, direct digital mammography units should be purchased. It is paramount for breast screening units to share their experience of direct digital equipment and radiology systems integration so that practitioners, managers and units as a whole can learn the best way to implement and avoid disruption when bringing these systems live.

**Outcomes and Discussion:** The limitations of digital imaging such as downtime and the importance of patient demographics will be examined. The importance of good staff training to ensure efficient workflow at all stages of the screening process shall be highlighted. The implementation of digital imaging in the breast screening unit has identified the essential requirement for a PACS administrator role.

#### P-073 **How to create a cost effective, sustainable and future proof PACS ecosystem**

*Jamie Clifton, BridgeHead Software*

Over the coming years, the future direction of PACS is going to be defined more by finance than by clinical objectives. Given this, and with 2013 approaching (2015 in London), how can PACS leaders structure their systems today, so as to keep the 'accountants' appeased whilst creating an environment that is sustainable and future proof?

Aim:

- 1) what the next generation PACS ecosystem might look like - particularly as it pertains to storing, protecting and sharing medical images;
- 2) how hospitals can transition from their current environment to this new solution.

This presentation focuses on the underlying PACS ecosystem and will cover:

Understanding your data profile: critical in creating systems to better store, protect and share content

Opening up your storage environment: escaping vendor lock-in, reducing cost and increasing effectiveness for the retention and management of PACS data

Implementing disaster recovery (DR) capabilities for your PACS environment

Learning how a PACS aware content storage system can facilitate more effective data management

Devising a realistic and practical approach to data migration.

#### P-074 **DICOM part 10: good news or bad news?**

*Jamie Clifton, BridgeHead Software*

Many feel that implementing DICOM Part 10: "Media Storage and File Format for Media Interchange Storage" is a fantastic opportunity to reclaim and manage PACS data, in a standard format, so that it can be accessed by all stakeholders, as and when required, now and in the future.

This session will explore whether this is the case and whether the full adherence to Part 10 has any knock on effects to other aspects of the PACS ecosystem?

In this presentation, we will examine:

- the benefits of DICOM Part 10
  - the potential impact of implementing Part 10 on:
    - o the efficiency of the storage system
    - o the speed of access and retrieval
    - o the management of demographic updates
    - o the creation and maintenance of DICOMDIR
- a different approach to implementation - where hospitals 'cherry pick' the elements of Part 10 that provide the most value to their PACS ecosystem.

## Advances in technology

### P-075 **Role of MR imaging in Gaucher disease**

*Darren Walls; Susan Pickman; Bianca Lottmann; Janet Malleson; Simone Livornese; Carl Evans; Sami Jeljeli*

*MRI Unit, Royal Free NHS Trust, London*

**Introduction:** Gaucher disease is a genetically inherited disorder and is the most common lysosomal storage disease. The body is unable to produce an enzyme (glucocerebrosidase) that is required to break down glucocerebroside. It results in the accumulation of this lipid compound in the lysosomes of macrophages, predominantly in the reticuloendothelial system. These abnormal cells are termed Gaucher cells. Consequences of this abnormal storage cause hepatomegaly, splenomegaly, anaemia, thrombocytopenia, and bone problems - bone crises, acute/chronic pain and Avascular Necrosis (AVN). It can also affect the lungs, brain and impair growth. Magnetic Resonance Imaging (MRI) provides a non ionizing imaging technique that can assess bone marrow abnormalities, AVN, liver/spleen volumes, provide Bone Marrow Burden (BMB) scores and Quantitative Chemical Shift Imaging (QCSI) that measures displacement of fatty marrow by Gaucher cells.

**Methods:** Examination of the MR imaging of several case studies of patients diagnosed and treated with Gaucher disease. Systematic review of the relevant medical literature has been employed to support the role of MR imaging in this disease as well as to include future MR imaging techniques that could prove useful in the management of these patients e.g. MR Spectroscopy (MRS) and Diffusion Tensor Imaging (DTI).

**Results/ Discussion:** MRI is an extremely useful imaging modality for the management of patients with Gaucher disease. It can monitor the responses of Enzyme Replacement Therapy (ERT) and Substrate Replacement Therapy (SRT). Demand for MR scanning in this cohort of patients will inevitably increase as mounting investment in treatment strategies are being investigated with multicentre Randomised Control Trials (RCT's).

### P-076 **Imaging the augmented breast**

*Lisa Porter-Bennett; Rita Borgen; Doreen Seddon;*

*East Lancashire Hospitals Trust; University of Salford;*

Research suggests there are growing numbers of women having breast augmentation in the UK and the impact on the NHSBSP will continue to rise in the future (Colville 2003, McIntosh 2008).

Mammography is still the most cost effective method of detecting breast cancer at an early stage even for women with augmented breasts. Evidence suggests that implants can prevent visualisation of breast tissue and can cause changes which could hinder cancer diagnosis (McIntosh 2008). A modified technique was developed by Eklund (1988) which when compared to the standard view showed marked improvement in compression, additional breast tissue and improved image detail. Our aim was to evaluate Radiographer adherence to departmental protocols when imaging women with augmented breasts in the screening setting and to evaluate technique. A retrospective review of image sets taken before and after additional training was undertaken. Before training in 50% of cases there was no attempt to carry out the modified view (increasing to 60% after training) and in only 63% of occasions was there an increase in visible breast tissue (increasing to 100% after training).

Departmental protocol on imaging women with breast implants is based on guidance from the NHSBSP (2002) and RCR (2003) and should be followed. Despite this the protocol was not being adhered to and there was only a 10% increase in the use of the modified view even after training. As this is the case it could be concluded that there needs to be national guidelines on imaging women with augmented breasts.

### P-077 **Six year longitudinal study of pressure force in screening mammography**

*Claire Mercer; Peter Hogg; Katy Szczepura; Erika Denton; George McGill;*

*Royal Bolton Hospital NHS Foundation Trust; University of Salford; University of East Anglia, The Christie NHS Foundation Trust*

**Aims/Objectives:** Our previous research identified applied pressure in mammography is more heavily influenced by practitioners than clients. With pressure variability in mind, this retrospective longitudinal study (6 years) assessed 3 consecutive screening attendances, to determine how pressure varied within and between practitioners and clients.

**Content:** Consecutive screening mammography with retrospective selection of 500 clients, commencing at 50 years old. One centre using GE DMR+ analogue mammography machine. Recorded data included: practitioners, applied pressure, breast thickness, BI-RADS density, dose estimations. Exclusion criteria: previous breast surgery, previous /ongoing interventions including assessment, implants and volume change.

**Relevance /Impact:** To assess if pressure application has any dependence on the practitioner rather than the client.

**Outcomes:** pressure variations over 3 screens were noted for the same client. Amount of pressure applied highly dependent upon the practitioner. 3 practitioner compressor groups were demonstrated - high (mean 126N), intermediate (mean 89N) and low (mean 67N). Same client: when the same practitioner performed the 3 screens, pressure variation was low (-40N to +25N); when practitioners from different compressor groups performed 3 screens variations were higher (-20N to +100N). Retrospective dose analysis demonstrate mean reductions of 0.07mGy (MLO), 0.05mGy(CC) from an image taken by low compressors compared to an image taken by high compressors.

**Discussion:** The amount of pressure used seems highly dependent upon practitioner rather than client factors. Implications for radiation dose and image quality consistency. It may also affect client experience re-attendance over sequential attendances.

#### **P-078 The use of vacora biopsy in the NHSBSP**

*Claire Mercer, Royal Bolton Hospital NHS Foundation Trust*

**Aims/Objectives:** The aim of NHSBSP is to ensure accurate diagnosis at the earliest detectable stage whilst minimising the number of women for open biopsy for benign disease and maximising the number of women with cancer with a non-operative diagnosis of malignancy. As such, the requirement for diagnosis on first biopsy is high. The use of larger gauge needles and vacuum assistance for the assessment of suspicious lesions enables prompt diagnosis and can obliterate the requirement for open biopsy.

**Content:** Our service utilises various biopsy devices; namely the Mammotome®, Vacora® and Achieve® systems. The use of Vacora® is a relatively new introduction to our service. The device is used in conjunction with other biopsy products and is not considered to be a replacement. An introduction to the device and the training that is to be considered if introducing this technique to your service follows.

**Relevance/Impact:** This will aid to highlight good practice and identify training requirements for staff new to this technique.

**Results:** The system is intended for diagnostic sampling of breast tissue and is not used for therapeutic excision. It is excellent for calcification evaluation and is a simple procedure which is carried out during the assessment clinic appointment. It achieves highly accurate diagnostic results with the advantages over traditional 14g core biopsy being its ability to target vague diffuse areas. The patient's acceptance of the procedure remains high in our service.

**Discussion:** The Vacora® breast biopsy under stereotactic guidance is used in this department with increasing regularity and is now becoming the procedure of choice for first line investigation for an increasing number of breast lesions. It may also affect client experience re-attendance over sequential attendances as women find higher pressures more uncomfortable.

#### **P-079 Optimising paddle and detector pressures and footprints in mammography**

*Alison Darlington; Peter Hogg; Katy Szczepura; Anthony Maxwell;*

*Pennine Acute NHS Trust; University of Salford; Royal Bolton Hospitals NHS Foundation Trust;*

**Introduction:** The breast is compressed during mammography between a fixed detector plate and a moveable compression plate. Ideally these should exert a uniform pressure on the breast. This study compares different detector positions relative to the breast to determine which give the most balanced surface pressures and contact areas (footprints).

**Method:** A breast phantom of similar compression characteristics to female breast was mounted on a rigid torso. Positioning (CC projection only) was in line with recommended practice. A flexible multi-sensor pressure mat was wrapped around the phantom so that breast/detector and breast/paddle pressure readings could be taken simultaneously. Readings were taken using Hologic Selenia and Selenia Dimensions mammography units, each with two different paddles, at 60N, 80N and 100N and at five vertical detector positions (-2cm, -1cm, 0, +1cm and +2cm) relative to the infra-mammary fold (IMF).

**Discussion:** For each of the conditions, paddle and detector footprints and pressures were extracted and the relative pressures from paddle and detector and relative indices of footprint and pressure for paddle and detector were calculated. A detector position of +1cm or +2cm gave the best pressure and footprint balance (approximately 50:50). At baseline (detector at IMF), higher pressures were from the paddle. A detector position below the IMF gave the worst balance (approaching 100% of pressure from the paddle).

**Conclusion;** For our phantom, optimum footprint and pressure balance is obtained by positioning the detector 1 to 2cm above the infra-mammary fold. This may have implications for clinical practice. A volunteer study is planned.

#### P-080 **Staff-client interactions within a breast screening assessment clinic**

*Lisa Porter-Bennett; Rita Borgen; Julie Nightingale;  
East Lancashire Hospitals Trust*

**Background / Aims:** 5-9% of women attending routine mammography have suspicious findings requiring further investigation. Women undergo either low intervention assessment (clinical examination, mammography or ultrasound), or high intervention assessment (breast biopsy). A significant proportion of women will be found to be normal (false positive) and are referred back into the screening programme.

Women with false positive diagnoses are at greater risk of cancer at the next screen, therefore it is essential they are encouraged to attend subsequent screening, but assessment-related psychological distress may contribute to subsequent non-attendance. This study analyses screening re-attendance rates in false positive women.

**Method:** Retrospective audit (2004-6) of false positive diagnoses, capturing data on: re-attendance rates; eligibility for subsequent screening; no. screening rounds attended; assessment tests.

**Results:** 228 women referred to assessment (2004-6) were false positive (returned to routine recall). 75% had attended more than one round of screening. Of those eligible for subsequent screening 17.5% (n = 40) did not re-attend (24.6% 2004, 20% 2005, 10.1% 2006), 13.2% non-attender's had received low intervention assessment and with 4.4% having biopsy with stereo taxis and none having ultrasound guided intervention

**Conclusion:** The number of false-positive women failing to re-attend for screening is greater than published literature, with those undergoing high intervention surprisingly more likely to return. False-positive women are in a higher risk group for cancer and re-engagement with the screening programme is vital. The study centre is therefore undertaking a patient experience evaluation in the assessment clinic to identify strategies for increasing subsequent attendance.

#### P-081 **Role expansion in mammography: the Australian perspective**

*Helen Warren-Forward; Sheila Moran;*  
School of Health Sciences, University of Newcastle, Australia;

The main purpose of this study was to investigate the attitudes of BreastScreen Australia radiographers toward mammography screen reading and to determine other areas of interest in role extension.

**Method:** A questionnaire was sent to radiographers working in BreastScreen Australia programs. Information on demographics, current duties and possible future role extension was collected.

**Results:** Questionnaires were returned from 253 radiographers. Currently 69% of radiographers working in mammography are over 45 years old, and have been doing mammography for at least 10 years. Radiographers under 30 years old make up less than 7% of the current workforce with part-timers comprising 63%. While being passionate about their role in BreastScreening, the results highlighted that radiographers working in Australia have an interest in role extension with more diversity in mammography being supported by 73% of the respondents. The radiographers indicated they would feel reasonably confident to undertake image interpretation, and a majority (79%) were prepared to undertake extra training and demonstrated that the importance of increased pay for these extra responsibilities (39%) lagged behind the importance of increased enjoyment and interest in mammography (66%).

**Conclusion:** An estimated 78% response rate indicates that the data obtained is representative. The introduction of flexible roles and responsibilities may give radiographers a better understanding and passion for mammography improving recruitment issues. This is especially important as it is estimated that 30% of BreastScreen Australia staff will retire within the next five years.

**P-082 Specimen radiography of wide local excision for breast cancer – what is the gold standard?**

*Thomas Marsh; Hilary Harris; Geoffrey Naisby;  
James Cook University Hospital, Middlesbrough*

Intra-operative specimen radiography allows the breast surgeon to assess whether a non-palpable lesion has been adequately excised, or if immediate further margin excision is required. Our wide local excision (WLE) specimens are currently imaged in a Faxitron computed-radiography (CR) specimen cabinet with the imaging plate temporarily removed from the cassette. We audited the quality of specimen images obtained using Agfa CR and a Siemens Novation full-field digital (FFD) mammography unit.

15 cases were imaged using both techniques (CR and FFD) between November 2010 and November 2011. Specimen radiographs were assessed by three breast radiology practitioners – a consultant breast radiologist, an advanced breast practitioner and a radiology SpR year 5. We scored the conspicuity of microcalcifications (both within the lesion and in the surrounding tissue) and lesion margins. Scores of 1, 2 or 3 indicated whether FFD images were of lower, equal or higher quality than CR images. A third assessment, collating the first two results, gave an overall appraisal of FFD versus CR. Images were interpreted on a mammography-quality PACS workstation with a single monitor in ideal lighting conditions and optimum windowing.

**Results:** FFD images were rated better than CR images in 76% of cases, and better or equal in 98% of cases. A particular strength of FFD is better conspicuity of microcalcifications within the excised lesion ( $p < 0.0001$ , Fisher exact test). Our gold standard for WLE specimen radiography has now shifted from cabinet CR to FFD mammography-acquired DR.

**P-083 Breast density measurements in digital mammography: detector stability analysis**

*Oliver Putt; Charlotte Kerrison; Jamie Sergeant; Tina Dunn; Susan Astley; Alan Hufton  
Department of Physics and Astronomy, School of Cancer and Enabling Sciences, The University of Manchester; Nightingale Centre and Genesis Prevention Centre, Wythenshawe Hospital;*

**Introduction:** For the longitudinal assessment of breast density detector stability is essential. We have thus analysed mean pixel value (MPV) per unit exposure (mAs) from five Full Field Digital Mammography (FFDM) systems over a period of 22 months.

**Methods:** Daily quality control (QC) data and servicing information were collected from five GE Senographe Essential FFDM units located at a static site and on mobile screening units between

January 2010 and October 2011. The QC data were plotted for each machine as MPV/mAs against time. Linear fits were applied to the data to determine whether the value of MPV/mAs could be regarded as constant over an extended period.

**Results:** Periods of up to 6 months in which the MPV/mAs data were stable were identified. Consecutive periods of stability were separated by sudden changes in the mean value of MPV/mAs. By comparing the dates of step changes with servicing records every change can be accounted for. Changes were a result of events such as detector replacement or detector recalibration following routine servicing.

**Discussion:** Our results provide conclusive evidence that the GE Senographe Essential machines are stable over extended periods of time, with the mean value of MPV/mAs only changing in response to machine servicing. Stability allows longitudinal measurements of breast density to be made without the need to image a calibration object alongside the breast. The changes in MPV/mAs can thus be accounted for in the calibration data set.

#### **P-084 Minimising pressure variability in mammography – an exploratory calibration study**

*Peter Hogg; Melanie Taylor; Claire Mercer; Erika Denton; Katy Szczepura;*

*University of Salford; North Manchester General Hospital; Bolton Royal Hospital; University of East Anglia*

Pressure variations in mammography exist between and within practitioners. Variation may affect client experience, radiation dose and image quality. This research reports on a calibration study to improve consistency.

Automatic readouts of breast thickness accuracy vary between mammography machines. Therefore one machine (Hologic Selenia), serving a symptomatic population, was selected for calibration. 250 randomly selected clients were invited to participate; 235 agreed and 940 compression datasets were recorded (comprising breast thickness, breast density and pressure). Pressure was increased from 50N stepping through 10N aliquots until the practitioner felt pressure was appropriate for imaging; at each pressure increment breast thickness was recorded.

Graphs were generated and equations derived; second order polynomial trendlines were applied to the data using least squares method. No difference existed between breast densities but a difference did exist between 'small paddle' and 'medium/large paddles'. Accordingly data was combined, with the Y axis representing average change in breast tissue thickness from 50N. 4 composite graphs were created. Small paddle: CC  $y=0.0944x^2-3.4742x+15.968$  ( $R^2=0.9809$ ); MLO  $y=0.0944x^2-3.4742x+15.968$  ( $R^2=0.9809$ ). Medium/large paddle: CC  $y=0.1313x^2-4.4331x+19.21$  ( $R^2=0.9984$ ); MLO  $y=0.1323x^2-4.575x+19.88$  ( $R^2=0.9994$ ). Graphs were colour coded into 3 segments - low, intermediate and high gradients (<-2 (amber); -1<>-2 (green); <-1 (red)). We propose 130/135N could be an appropriate termination pressure using this mammography machine.

Using client compression data we have calibrated a mammography machine to determine its breast compression characteristics. This calibration data could be used to guide practice to minimise pressure variations between practitioners so improving client experience and reducing potential variation in image quality.

#### **P-085 Results of a CT dose audit of new technology scanners**

*Catherine Gascoigne; Arnold Rust; James Roberts;*

*Medical Physics Department, Cardiff & Vale UHB, University Hospital of Wales, Cardiff; Radiation Protection Department, Velindre Hospital, Whitchurch, Cardiff,*

A review of radiation doses delivered to patients undergoing X-ray CT examinations was undertaken for three newly installed scanners, in addition to one having undergone a major software upgrade and another having undergone optimisation of all thorax protocols. Three of the scanners featured the GE ASiR reconstruction algorithm, claimed by the manufacturer to reduce radiation dose whilst maintaining image quality. Audit questionnaire sheets were completed by radiography staff at each participating site and information was recorded for each procedure, to include patients' height,

weight, examination type, dose-length product (DLP) and scan length. Mean DLP values for each scanner were collated for a range of "standard" procedures carried out on patients of average weight. These values were compared between hospitals, with equivalent results from a similar audit in 2010 and with National Diagnostic Reference Levels (NDRLs) recommended by the NRPB, where available. Standard exposure parameters were inspected to determine whether protocols were optimised and whether changes made since the previous audit correlated with changes in dose. For the majority of procedures, new technology and protocol optimisation were found to have contributed to a significant reduction in patient dose. Many mean DLPs were also found to have fallen from their 2010 values to below the recommended NDRL.

**P-086 The impact of tube current variation on lesion detection in the attenuation correction image co-incidentally acquired for myocardial perfusion imaging in SPECT/CT: a phantom based study**

*John Thompson; Samantha Higham; Peter Hogg; David Manning; Katy Szczepura; University of Salford; University Hospitals of Morecambe Bay NHS Foundation Trust; Pennine Acute Hospitals NHS Trust; Lancaster University;*

**Aim:** Assess the impact of tube current (mA) on a readers' ability to accurately localise simulated pulmonary lesions on the attenuation correction (AC) CT image acquired for SPECT/CT myocardial perfusion imaging.

**Method:** Four mA settings (1, 1.5, 2 and 2.5) were evaluated using the GE Infinia Hawkeye 4. All other CT acquisition parameters remained constant throughout. An anthropomorphic chest phantom containing simulated pulmonary lesions was scanned on each mA setting without any movement of the phantom between scans to produce of a case-matched series of images (27 cases showing 0-4 lesions) suitable for free-response receiver operating characteristic (FROC) analysis. Images were evaluated using our novel web-based ROCView software under controlled conditions. The area under the ROC curve (AUC) index was obtained using jackknifing (JAFROC) methods and Multi-Reader Multi-Case (DBM-MRMC) analysis. A difference in performance would be considered statistically significant at  $p < 0.05$ . 20 readers of varying CT experience (0-24 years) evaluated 108 images using an ordinal scale to score confidence.

**Results:** Analysis showed that there was no statistically significant difference in performance between mA settings ( $p = 0.826$ ) according to ANOVA. However, average localisation performance was weaker at 1mA (AUC = 0.714) compared to the three higher dose settings (AUC = 0.736, 1.5mA; AUC = 0.738, 2mA; AUC = 0.733, 2.5mA).

**Conclusion:** All mA settings allowed similar lesion detection performance. This suggests that lesion visibility is preserved at lower mA /lower dose values; this study could have implications for diagnostic quality CT in terms of dose reduction strategies.

**P-087 Lesion detection in the CT attenuation correction image of 5 different low resolution SPECT/CT systems: a multi-centre study**

*John Thompson; Katy Szczepura; David Manning; Peter Hogg; University of Salford; University Hospitals of Morecambe Bay NHS Foundation Trust; Lancaster University;*

**Aim:** Assess lesion detection performance of the CT attenuation correction (AC) image produced for myocardial perfusion imaging of 5 different SPECT/CT systems.

**Method:** An anthropomorphic chest phantom containing simulated lesions was scanned at 5 centres using the departmental CT AC acquisition. Simulated lesions were not moved between scans; producing case-matched images (26 cases showing 29 simulated lesions) suitable for free-response receiver operating characteristic (FROC) analysis. Images were evaluated using our novel web-based ROCView software. The area under the ROC curve (AUC) index was obtained using jackknifing

(JAFROC) methods and Multi-Reader Multi-Case (DBM-MRMC) analysis. A difference in lesion detection performance would be considered statistically significant at  $p < 0.05$ . 19 readers of varying CT experience (0-4 years) evaluated 130 images scoring confidence using a continuous rating scale.

**Results:** Analysis of the AUC index showed a significant difference in lesion detection performance for this sample of readers ( $p < 0.005$ ). Table 1 describes the lesion detection performance of each SPECT/CT system. The first generation system, GE Millennium VG (Hawkeye option), achieved an AUC score representing unreliable capability for lesion detection in this study.

Centre	Scanner	Eff. mAs	CTDI <sub>vol</sub>	AUC (95% CI)
1	Infinia Hawkeye 4	30.36	3.967	0.754 (0.623-0.844)
2	Infinia Hawkeye 4	24.29	3.173	0.839 (0.765-0.912)
3	Millennium VG (Hawkeye)	57.69	4.600	0.627 (0.494-0.760)
4	Infinia Hawkeye 1	57.69	4.112	0.670 (0.542-0.797)
5	Precedence 16	49.57	3.500	0.873 (0.788-0.957)

**Conclusion:** For SPECT/CT systems, there is large disparity in the CT system's ability to demonstrate simulated lesions in an anthropomorphic phantom. It can be speculated that the clinical value of these co-incidentally produced CT images is highly variable.

P-088 **The use of contrast enhanced ultra sound (CEUS) for characterization of incidental focal hepatic lesions compared to contrast computed tomography (CT) and contrast magnetic resonance imaging (MRI)**

*Waheedullah Mustafa; Sami Khan; Qaiser Malik;*

*Royal Free Hospital; Basildon and Thurrock University Hospitals;*

**Aims:** To highlight the importance of using CEUS as the evolving technology for characterization of incidental-focal-hepatic lesions compared to contrast-CT and contrast-MRI.

**Content:** This is a retrospective literature review comparing CEUS to contrast-CT/MRI for characterization of incidental-focal-hepatic lesions, which was undertaken during the preparation of a Business-Case for CEUS service at an NHS hospital.

**Impact:** Focal-hepatic-lesions are localized areas of abnormality in the liver. These include benign lesions, such as simple cysts, haemangiomas, adenomas; and malignant lesions, such as metastasis and hepatocellular carcinoma. They are commonly detected in the clinical practice 'incidentally' whilst performing imaging for unrelated clinical scenarios.

Currently, contrast-CT/MRI scans are used for characterization of such lesions. However, there are a number of advantages of using CEUS instead.

**Outcomes:** Results of this literature review shows significant cost-effectiveness and other advantages of using CEUS compared to contrast-CT/MRI including, higher sensitivity and specificity; reduction of hospital-stay and/or invasive liver biopsies; reduction of waiting-lists; ability to detect small metastasis; avoidance of contrast-induced-nephropathy (CIN), nephrogenic-systemic-fibrosis (NSF) and contrast allergy; avoidance of radiation-induced cancer; and providing real-time teaching and research opportunities.

**Discussion:** Ultrasound is the gateway for other imaging modalities. Current common practice in the UK is to image patients using baseline-B-mode ultrasound (without contrast) to detect focal liver lesions. If focal liver lesions are detected they then need to be characterized mainly to discriminate between benign and malignant through contrast-CT/MRI. This study outlines the importance of using CEUS for such characterization through highlighting various advantages of using CEUS.

P-089 **CT as an alternative to the skeletal survey in patients with multiple myeloma**



*Ruth Clarke; Lisa Field; Emily Lewis,  
Mid Yorkshire NHS Trust*

**Key learning Points:** To examine at the benefits of computed tomography (CT) skeletal survey in patients with multiple myeloma.

**Description :** The role of radiology in the assessment and monitoring of patients with multiple myeloma is to demonstrate evidence of the lytic lesions, the location and their extent. Conventional radiographs have limitations as 10-20% of patients may have normal results due to the under diagnosis of lytic disease and radiographs are limited in the assessment of response to treatment. CT has increased sensitivity and an ability to characterise trabecular anatomy in difficult areas such as scapulae, ribs and sternum. It also allows differentiation between benign and pathological compression fractures, and is superior in estimating fracture risk.

Other advantages of CT include

- Demonstration of unsuspected associated pathology such as lung disease, soft tissue and visceral masses and identifying suitable biopsy sites.
- Detection of small osteolytic lesions
- Multiplanar reconstructions.
- Excellent for radiotherapy planning and surgical intervention.
- Shorter examination time than skeletal survey.
- No repositioning of the patient therefore increased patient comfort.

Although CT was previously associated with increased radiation dose the effective radiation dose can be comparable with conventional radiography depending on the exposure parameters selected

**Conclusion:** We aim with case studies and examples of scanning techniques to demonstrate that whole body low dose multi detector CT is a viable alternative to the skeletal survey in patients with multiple myeloma.

#### P-090 **Radiographer led arthrograms**

*Lisa Brindle, Rebecca Leahy;  
RBH*

Arthrograms have been carried out solely by Radiologists for a number of years. Due to waiting list issues and the time constraints on Radiologists we were approached with regard to carrying out Radiographer led Arthrograms.

We applied to do the Advanced Medical Imaging course at Salford University and with Radiologist guidance we were trained how to carry out the Arthrogram procedure. We found we were the only Radiographers in the country to officially carry out this procedure. We had to create our own new technique/ procedure documents along with all the relevant PGD's for the drugs administered.

We now run our own Arthrogram lists . This has a huge impact on the service that is provided within the Radiology department and has dramatically reduced waiting lists and also added further patient groups for steroid injections which would normally have been carried out in theatre.

#### P-091 **Improvements made to the process in carrying out patient dose audits**

*Alexander Fergus Dunn; Simon Graham; Ryan Wilde; James Murphy;  
Integrated Radiological Services Ltd*

This project set out to automate and simplify the process of conducting Patient Dose Audits, in addition to correcting the calculated Entrance Surface Doses for individual patients based on age/exam type.

Included will be a brief history of how PDA's were carried out, the current process involving many steps and hours, methods we have used to improve the results, process and the final report, and the future of this service.

The improvements made to this service will have a major impact on the quality of the data used. Correcting ESD's based on patient age and/or exam type will vastly improve the accuracy of the reported data. RIS data is also used instead of hand written dose audit sheets; impossible data is

excluded along with data that doesn't conform to set parameters. Automation will increase the quality of the output of the report both visually and in terms of the data presented. In addition to the reduction of costs, automation also ensures mistakes are not made by using inaccurate or incorrect data.

The outcome is a reduction in time/cost spent producing reports and an increase in the quality of both the data and report.

To evolve in the future it is hoped that this process can be linked or expanded to include a dose engine to calculate an effective dose for individual patients based on exposure factors and patient size/age. It is also hoped that data will be collected straight from DICOM data, again increasing its accuracy.

**P-092 Does new CT generation mean eco-friendly radiation?**

*Marc Williams; Matthew Newport; Milan Sapundzieski; Pavel Janousek;  
Fairfield General Hospital, The Pennine Acute Trust;*

**Aim:** Audit patient radiation doses from the new Toshiba Aquilion PRIME CT scanner against national diagnostic reference levels (DRLs) and national average multi-slice CT doses.

**Method:** Patient radiation dose for five CT examinations (Head, Thorax, HRCT, Abdo/Pelvis, Thorax/Abdo/Pelvis) was measured by recording the Dose Length product (DLP) from 90 randomly selected patients. An average DLP radiation dose for each examination was calculated. Data was collected in April 2011 and again in November 2011 following use of certain radiation protection settings and increasing image slice acquisition in three of the five CT examinations.

**Results:** In April 2011 DLP in 56% of all CT examinations were within national DRLs; average DLP were within national DRLs in three CT examinations including CT Head (850 DLP), Thorax (370 DLP), and Thorax/Abdo/Pelvis (730 DLP). CT Head, Abdo/Pelvis and HRCT DLP (850, 590 and 240 respectively) exceeded national average multi-slice CT DLP (830, 530 and 140 respectively). In November 2011 DLP in 79% of all CT examinations were within national DRLs; average DLP were within national DRLs in four CT examinations including CT Head (860 DLP), Thorax (180 DLP), Abdo/Pelvis (520 DLP), and Thorax/Abdo/Pelvis (450 DLP). CT Head and HRCT DLP (860 and 330 respectively) exceeded national average multi-slice CT DLP (830 and 140 respectively).

**Conclusion:** Majority of patient radiation doses for the new CT scanner were within national DRLs however some CT examinations reported higher than national average doses. Becoming more experienced in using new software settings can reduce patient doses.

**P-093 Reducing radiation dose in CT colonography**

*Amit Parekh; Iara Sequeiros; Paul McCoubrie;  
North Bristol NHS Trust; Bristol Royal Infirmary;*

**Aim:** To audit the radiation dose of CT Colonography (CTC) at a district general hospital.

**Relevance:** The use of CTC for the detection of bowel cancer is increasing in the UK. This is partly due to the introduction of the bowel cancer screening program. As the use of CTC becomes more widespread, particularly in asymptomatic patients, radiologists must ensure that radiation doses are kept as low as reasonably practicable.

**Standard:** The mean effective dose of CTC should not exceed the CTC dose range in the literature (4.0-13.2 mSv).

**Methods:** Dose-length products of 70 patients undergoing CTC were recorded from two CT scanners: a 64 slice scanner and a 128 slice scanner. Effective dose was calculated using transfer factors.

**Results:** The overall mean effective dose was 16.7 mSv. The mean effective doses from the 64 and 128 slice scanners were 12.0 mSv and 19.9 mSv respectively. Outcomes: A review of CTC protocols identified that the 64 slice scanner used a fixed CTC protocol. The 128 slice scanner used a dose modulation system that adjusted tube current to acquire high quality images at the expense of dose. We therefore implemented a low dose protocol for this scanner. A re-audit of 76 patients undergoing CTC on this scanner found that mean effective dose decreased to 12.3 mSv.

**Discussion:** Keeping CTC dose as low as reasonably practicable is vitally important. In order to achieve this, dedicated low dose CTC protocols should be used and dose audits need to be performed on a regular basis.

P-094 **Radiological investigations and ionising radiation: how aware are we?**

*Sheena Patel; Sonia Bouri; Francesca Ng; Ravi Lingam; Ritish Soobrah;*

*St Mark's Hospital; North West London Hospitals; Northwick Park Hospital;*

**Aims/Objectives:** To assess Foundation Doctors' awareness of ionising radiation from common radiological investigations.

**Content:** 60 Foundation Doctors (FD) completed a questionnaire designed to test their knowledge on radiation doses associated with common diagnostic imaging procedures; they were also asked to specify the certainty of their answers. Other questions focussed on identifying which investigations emit ionising radiation. The trainees received no prior tutorials/lectures on this subject.

**Relevance/Impact:** The increasing use of diagnostic imaging studies has given rise to growing fears over the risks associated with high levels of radiation exposures. Many studies have also raised concerns over the limited awareness of these risks amongst medical students and referring doctors.

**Outcomes:** With regards to radiation doses, 49% of all questions were correctly answered. Over half (54%) of trainees had guessed these correct answers. 28% underestimated the doses of radiation associated with these investigations. 12% and 15% of FD believed that CT scans and abdominal radiographs respectively do not involve radiation; 25% believed that angiograms do not involve radiation. 10% believed MRI involves the use of radiation. 25% of trainees correctly identified the risk (1 in 2000) of inducing a fatal cancer from an abdominal CT.

**Discussion:** Since FD are responsible for organising and requesting various diagnostic imaging studies, it is crucial they are aware of radiation exposures associated with these investigations. This study highlights poor awareness of radiation doses and potential risks of ionising radiation amongst FD and hence emphasises the need to educate current and future referring doctors.

P-095 **Dose reduction in CT pulmonary angiography - a district hospital experience**

*Andrew Yeung; Ai-Lee Chang;*

*Department of Radiology, Royal Victoria Infirmary, Newcastle upon Tyne; South Tyneside District Hospital, Tyne and Wear,*

**Aims/Objectives:** To present the results of the introduction of dose-reducing techniques in CT pulmonary angiography (CTPA) in a district hospital setting.

**Content:** The protocol for CTPA was recently changed in our institution. As the number of CTPAs requested has rapidly increased in recent years so has concern about radiation dose to patients. Based on recent literature findings the decision was made to reduce the imaged scan range in an effort to reduce dose whilst trying to maintain diagnostic quality. A further dose-reducing technique (iterative reconstruction) was introduced a few months later. The effect on dose at each step is presented.

**Relevance/Impact:** Our experience with these dose-saving techniques will be presented along with an analysis of the data. This information will be of relevance to all those involved in the delivery of a CT service.

**Outcomes:** Comparison of patient dose levels before and after the introduction of the reduced scan range technique showed a significant reduction in patient dose ( $p < 0.0001$ ). The introduction of an iterative reconstruction technique further significantly reduced the dose ( $p < 0.0001$ ).

**Discussion:** The phased introduction of two dose-reduction techniques over the space of just a few months has delivered significant dose savings. First, a reduction in scan range resulted in a 20% dose saving. The use of a new iterative reconstruction technique resulted in a further 30% dose saving. No perceived reduction in diagnostic quality was observed.

P-096 **Weight bearing lumbar spine X-rays: PA or AP, a dose comparison**

*Jonathan Sharp; Bruce Young;*

*Guy's and St Thomas' Hospital Foundation Trust*

**Aims:** To conduct a pilot study investigating a potential patient radiation dose reduction by imaging weight-bearing lumbar spines PA (SID =180cm) compared to AP (SID =115cm).

**Content:** Patient size, kV and image density were kept constant in the study. AEDs were used to control the mAs. Dose data was collected and compared from patients undergoing plain film, weight-bearing lumbar spine imaging, PA and AP. Data collected for imaging in the lateral position at the two SIDs was also compared. Three different rooms were used in the study. The data was analysed using one tailed T-test.

**Outcomes:** Significant reduction in dose was found in all 6 comparisons, with the exception of one. The PA radiographs were shown to have a significant reduction in dose of 56% compared to the AP radiographs. The dose associated with the lateral images at different SIDs was also significantly reduced (48%). When diagnostic image quality was assessed by comparing magnification and unsharpness, no significant difference was found.

**Discussion:** Theoretically, increasing the SID and changing the orientation of patients when imaging the lumbar spine should reduce the dose to the patient and their radiosensitive organs, but may also affect image quality adversely. Facing the image receptor allows the patient to hold onto the wallstand and may help reduce movement artefact. The findings of this study support these theoretical assumptions and comply with the principles of ALARP. The authors of this study believe the new acquisition parameters described should be adopted when imaging the erect lumbar spine.

P-097 **Investigation of exposure condition and safety parameters used in clinical ultrasound**

*Sarah Hagj, Mawya Khafaji; Julie Ann Sonbul;*

*King Abdulaziz Univesity Hospital*

**Purpose:** Ultrasound is a safe diagnostic tool used routinely in hospitals worldwide; however, with advancement of technology there is an increase in machine output which might proportionally increase the thermal and mechanical effects in tissue. Hence, the safety committee of the British Medical Ultrasound Society (BMUS) emphasized the importance of monitoring output levels of ultrasound equipment during normal clinical ultrasound scanning. The purpose of this study is to evaluate the acoustic output indices (AOI) at the Department of Radiology, King Abdul-Aziz University (KAU), Jeddah- Saudi Arabia and compare the current practice with these safety guidelines.

**Methods:** All Sonographers working in the Department of Radiology at King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia were asked to fill out a questionnaire for every patient scan completed between June 2 nd and June 23rd , 2011. The data collected consisted of type and duration of scan, ultrasound machine parameters, settings and output indices (mechanical and thermal).

**Results:** A total of 408 scans were conducted during the chosen period on 10 different ultrasound machines all by Philips. Scan types were: abdominal, obstetrics, pelvic, transvaginal, and small parts. The scan time ranged from 2 to 36 min for all scan types. The maximum thermal index (TI) and mechanical index (MI) recorded was 1.3 and 1.5 respectively.

**Conclusion:** All scans performed during this period comply with the safety guidelines set by BMUS with regards to TI and MI limits. However, restricted scan time was exceeded during 2( 1.5%) Obstetric scans (35 min with TI = 1.2).

P-098 **An audit of the quality of CT pulmonary angiogram studies at a busy teaching hospital**

*Anoma Lalani Dias; Kathryn Tran; Simon Gill; Sashin Kaneria;*

*Imperial College Healthcare Trust*

**Aims:** Pulmonary embolism (PE) is a common acute cardiovascular presentation which results in significant morbidity and mortality. CTPA is the investigation of choice in patients with a high clinical

suspicion of PE. Radiologists should be aware of the multiple factors affecting CTPA quality which impact upon accurate evaluation and implementation of measures to overcome poor quality studies.

**Content:** Review of imaging and reports of 114 patients who had CTPA. Scan quality assessed by: Automatic or manual trigger and location of trigger placement (standard 100% in pulmonary trunk) Mean pulmonary trunk density (standard 100% > 250 Hounsfield Units).

Overall optimality grading taking into account breathing artefact and opacification of each case by two observer review based upon literature standards of grade 0-4 on the level to which PE can be excluded (0 is unable to exclude, 4 is to subsegmental; grade 2 or less is suboptimal)

**Outcomes:** 18% of CTPAs positive with alternate diagnoses in 56% (in line with RCR guidelines).

13% manually triggered and 18% of triggers in incorrect locations.

29.8% suboptimal contrast opacification (below 250HU)

34% were grade 2 or less (suboptimal) in optimality grading

Reporter agreement in only half these cases.

**Discussion:** Radiologists should interrogate scan quality and should document this in the report.

Methods to improve scan quality include radiographer education regarding trigger locations and patient breathing instructions. The use of varied contrast volumes, time delays, saline chasers, test boluses and scanning direction in improving opacification are also discussed.

#### P-099 **Cost-effectiveness in radiologist reporting: are radiologists more efficient when they work longer hours?**

*William Hedqes; Shah Khan;*

*East Lancashire Hospitals NHS Trust*

**Aim:** Assess measure workload in a UK radiology department and compare the productivities and cost-effectiveness of consultants working different numbers of PAs in a large radiology department. to see whether those working longer hours are more cost-efficient.

**Content:** Reporting data from electronic records for 14 consultants working different numbers of PA during the period April 2010 - March 2011. These were then converted into relative value unit (RVU) scores using the Pitman-Jones RVU system. Crude and net workloads were calculated for each consultant by dividing their RVU score by the number of PAs they were paid for and how many they spent reporting.

**Relevance:** Increasing workloads, combined with current austerity measures are putting UK radiology departments under considerable stress. Although PACS and voice recognition software have allowed radiologists to increase productivity it may not be enough and we need to look at the most efficient ways to manage radiology departments as well.

**Outcomes:** It was found that there was statistically significant variation in productivity between consultants working different numbers of PAs ( $p < 0.05$ ). Consultants working 12 PAs were significantly more productive than other consultants, working a mean of 6490 RVUs per PA per year compared to 4722 RVU/PA/year for those working 10 PAs. It was found that there was statistically significant variation in productivity between consultants working 12 PAs than those on fewer PAs ( $p < 0.05$ ).

**Discussion:** Whilst UK consultants are highly cost-effective, those working 12 PAs per week are more so than those working fewer PAs. The reasons for this are unclear but many of the Consultants on 12 PAs were senior and experienced and may be quicker with higher turnover. However, and further research is needed to identify why this is the case. An UK specific RVU system would make productivity analysis more accurate.

#### P-100 **Reporting workloads in of reporting radiographers and sonographers: an exploratory study: cost effectiveness compared to consultant radiologist**

*William Hedqes; Shah Khan,*

*East Lancashire Hospitals NHS Trust*

**Aims:** To accurately measure the workload of radiographers and sonographers for the first time in the UK and compare them to that of consultant radiologists in a DGH.

**Content:** Reporting data for sonographers, reporting radiographers and consultant radiologists at a large DGH was taken from electronic records during the period April 2010 - March 2011. These were converted into an RVU score using an adapted version of the Pitman-Jones RVU system. Reporting workload was calculated by dividing the total group RVU scores by the number of PAs worked by each group.

**Relevance:** Non-medical reporting staff play a significant role in dealing with increasing radiology workloads in the UK with radiologists. Although accuracy of this reporting has been previously measured, actual workload levels of sonographers and reporting radiographers have never been measured. It is important to do this so that we can improve cost-effectiveness and fully recognise the contribution of these valuable members of staff.

**Outcomes:** There were 9 sonographers working 80.5 PA/week, 2 reporting radiographers worked 10 PA/week, and 14 consultant radiologists working 158.21 PA/week during the period April 2010 - March 2011. Sonographer workload amounted to 1,955.9 RVU per PA per year (RVU/PA/year). Radiographer workload was to 4,277 RVU/PA/year. Crude consultant radiologist workload was 4,106 RVU/PA/year, but they spend 42.49% of their time on non-reporting activities, giving a net score of 7,140 RVU/PA/year.

**Discussion:** RVUs can be used to measure reporting workload for non-medical reporting staff. This can then be compared to radiologist workloads. Reporting radiographer workloads are similar to those of consultant radiologists, but workload of sonographers appears to be lower. This may be due to a variety of factors and requires further work to analyse fully. The reporting radiographers and sonographers make a valuable and significant contribution dealing with the increasing radiology workload. However, radiologists are more productive.

P-101 **An audit of the utility and accuracy of ultrasound imaging in the diagnosis of acute appendicitis in a district general hospital paediatric population**

*Anoma Lalani Dias; Shema Hameed; Ashish Saini; Jeremy Berger;*

*Imperial College Healthcare Trust; Barnet and Chase Farm Hospitals NHS Trust;*

**Aims:** Appendicectomy is one of the most common paediatric emergency operations. Prompt accurate diagnosis has a significant beneficial impact and can not only improve diagnostic accuracy but also detect other pathology. Ultrasound scanning (USS) in acute appendicitis is useful particularly in children where the diagnosis can often be more challenging and where radiation protection is a more important consideration. An audit looking at the use of the ultrasound and its diagnostic accuracy was performed.

**Content:** Appendicectomy specimens in one year aged 0-16 years were analysed and evaluation of relevant imaging performed together with histological correlation. Targets for standards of Negative appendicectomy rates (<6%), sensitivity (80%) and specificity (94%) together with negative and positive predictive values (PPV - 95% and NPV - 90%) based on literature review.

**Outcomes:** Total 118 included patients.

20.3% negative appendicectomy rate (higher than literature standard of 6%)

23.8% had USS

Sensitivity = 26.8% (i.e. probability that US detected appendicitis when present)

Specificity = 100% (i.e. probability that USS was negative when appendicitis not present)

NPV = 39.1% (i.e. proportion of patients with negative USS correctly diagnosed)

PPV = 100%

**Discussion:** USS is currently under utilised in the diagnosis of acute appendicitis in this population. Significantly lower than expected sensitivity and NPV rates obtained compared with literature standards. Potential reasons for this are discussed including high false negative rate in early case and

the importance of not ignoring ancillary findings e.g. localised free fluid in this population as well as optimising scanning technique.

**P-102 Leadership qualities framework: can you improve over time?**

*Suzanne Henwood, Lisa Booth;*

*Unitec Institute of Technology, New Zealand; University of Cumbria*

**Purpose:** This paper is part of a wider, CORIPS funded case study, which explored the leadership function of 6 consultant radiographers in the UK. This paper explores the change in leadership capabilities demonstrated by the repeated LQF, as a result of involvement in the study, executive coaching provided and an increased awareness of, reflection on, and analysis of the leadership function.

**Methods:** A longitudinal case study was used as a framework for this study. A range of data collection methods were used to triangulate data and increase validity, including an objective leadership measure (the Leadership Qualities Framework (LQF)) which was undertaken prior to any interventions and at the end of the study.

**Results:** The study found that there was clear evidence of change over time. The qualitative data highlights the impact of specific interventions on those changes, in the opinion of the consultants involved.

**Conclusion:** The results clearly demonstrate that leadership function can be impacted on over time and offers suggestions as to which specific interventions resulted in a measured change, which could impact on future development planning for advanced and consultant practitioners.

## Service delivery

**P-103 Should surgeons be responsible for acute ultrasound list? Our experience in a tertiary centre**

*Cindy Leung, Cardiff and Vale University Health Board*

**Background:** In our centre a daily ultrasound list dedicated to acute surgical patients has been implemented to facilitate patient turnover. On-call surgical teams are responsible for patient booking and preparation. We systemically reviewed our service and aimed to introduce changes for further improvement.

**Method:** We prospectively studied the appropriateness of requests and patient preparation for the dedicated ultrasound list for a 3-week period in January 2010. A trust-wide ultrasound patient preparation guideline was subsequently introduced and junior doctors ultrasound teaching sessions were introduced. We re-audited this service in the following year.

**Results:** In 2010, inadequate preparation occurred in 21 scans out of 91 patients. 'Full bladder' was not achieved in 58% of scans where it was required. Similarly, 12% of patients did not accomplish 'Nil-by-mouth' when required. Three ultrasound scans were inappropriately requested. Following the guideline introduction and junior doctor education, an improvement in patient ultrasound preparation was observed in our re-audit of 115 patients, with only 36% and 5.6% of patients not achieving 'full bladder' and 'Nil-by-mouth' respectively. There remained 4 inappropriate ultrasound requests.

**Conclusion:** Our new service has been highly valued amongst surgeons. With appropriate guideline and education, satisfactory standards of service provision can be accomplished especially in a busy tertiary centre where ultrasound demand is high. Similar working model is applicable to other hospitals in the UK to manage the increasing radiology demand

**P-104 Omitting neck ultrasound in lung cancer – making best use of a department of radiology or an opportunity lost?**

*Trupti Kulkarni, Amey Aurangabadkar;*

*Walton Centre for Neurosciences; Whiston Hospital;*

**Objectives:** Staging CT chest to include the lower neck and PET-CT (where radical treatment is being considered) may obviate the need for cervical ultrasound in N3 disease.

**Relevance/impact:** Lung cancer is a leading killer in the UK. The notorious status awarded to it has resulted in numerous guidelines regarding management. Radiology is an important component of this management. Cervical ultrasound for confirming N3 disease is recommended as per BTS guidelines. However, this may not influence patient management and also involves logistic issues with scan times and costs.  
**CONTENT OF PRESENTATION:** We present our 2 year data of 100 lung cancer patients encountered in our tertiary set up situated in a socially deprived area of the UK. The staging CT scans of 100 consecutive patients with biopsy proven lung cancer were reviewed to confirm or refute the presence of N3 disease. Further imaging if any and reports thereof were checked on the PACS system. Presently, cervical ultrasound for supraclavicular lymphadenopathy in lung cancer is not part of our standard practice.

**Outcomes:** All 100 staging scans included the lower neck as per BTS guidelines. Patients being considered for radical treatment underwent PET- CT as standard practise in keeping with guidance. However our patients with N3 disease did not undergo neck ultrasound. Out of 94 cases included in the final evaluation, 22 (23%) had supraclavicular lymphadenopathy none of which were subjected to cervical ultrasound. Of these 13 (60%) had lymph nodes measuring > 5 mm (largest measuring 11 mm). The remaining 9 had lymph nodes < or = 5 mm (40%). Of all the patients with supraclavicular lymph nodes 14 had T4 disease with 7 patients having M1b disease. Patients with T2 or T3 disease and no distant metastases were 7 in number none of whom were considered fit for radical treatment.

**Discussion:** Staging CT chest to include the lower neck and PET-CT (where radical treatment is being considered) may obviate the need for cervical ultrasound in N3 disease. Cervical ultrasound is not presently part of standard work-up for lung cancer in our set-up. However, it can be performed in appropriately selected cases.

#### P-105 **Utilising BICS for workflow re-design in a digital screening mammography service**

*Claire Mercer, Royal Bolton Hospital NHS Foundation Trust*

**Aims/objectives:** The introduction of a digital mammography unit into a new site initiated a number of changes to practice. New workflow arrangements were developed along with the identification of costs savings for the department.

**Content:** Identification of how using BICS principles can assist workflow re-design and assist with service delivery.

**Relevance/Impact:** The identification of how small changes to workflow can assist in client flow and increase service outcomes; which in turn will assist other services moving to digital mammography.

**Outcomes:** Using BICS principles we designed the room layout and sub wait layout to enable best flow and aimed to reduce the flow time for mammogram images and documents being received by 80%. We identified a potential cost saving to the department by the introduction of better flow and improved the rate of staff engagement by 50% by assisting in the development of new workflow documents

**Discussion:** Improved flow time for the receipt of mammograms back at base site from 2-3days to immediately; improving the accessibility of images for double reading. Staff engagement for workflow procedures and involvement from the beginning for the design of the process. The re-design process of 'transportation' of documents to NBSS paperless system. The reduction of flow time by ceasing use of taxi service 90% of the time achieving saving of £12k to department. We achieved a saving of £12k per annum to the department

#### P-106 **Enhancing the quality of our services by using a quality toolkit**

*Sarah Wilson; Debbie Wapshott; Ashtami Bharathan,*



*InHealth Group Limited*

**Aims:** To provide all staff with useful tools to enable them to improve the quality of our service and obtain feedback from patients, customers, and colleagues.

**Methods:** A quality improvement framework, "Excellence in Action", was launched to ensure that all staff - clinical and managerial - were aware of what is expected from them in their everyday roles. A supporting toolkit was developed to provide tools which could be used to improve the following: working environment, communication, working together, caring for others and patient feedback. The Clinical Services Team held fifty workshops to introduce colleagues to the toolkit. Each department is required to complete 3 mandatory tools and select additional tools for ongoing quality improvement programmes. The benefits of implementing each tool are documented and shared with colleagues.

**Results:** Feedback is collected centrally on the tools completed and the other initiatives selected. This is reported monthly to senior management.

**Impact:** The framework and toolkit act as best practice reminders to all staff and provide an easy to implement project which improves patient care and colleague cooperation.

Monitoring complaints and incidents and ongoing patient feedback allows us to measure the improvements to patient care.

**Discussion:** The toolkit provides the means to initiate quality improvement projects and measure their impact using ready-to-use templates for obtaining feedback from patients and colleagues. The presentation will present some of the tools and how they are implemented as examples .

**P-107 Peer audit of image quality in gynaecological ultrasound. Is it feasible?**

*Peter Cantin, Karen Knapp;*

*Derriford Hospital, Plymouth; University of Exeter*

**Aim:** To develop an audit tool for peer-to-peer assessment of gynaecological ultrasound image quality.

To determine the best method of data collection (binary scale, Likert 5 point scale or continuous scale)

To test inter-rater agreement in using the tool

To determine whether length of experience and clinical grade affect inter-rater agreement,

To test whether ultrasound practitioners can identify when imaging difficulties contribute to poor image quality.

**Content:** A quantitative study to assess the effectiveness of peer audit among a group of sonographers in assessing image quality in gynaecological ultrasound. Six sonographers independently reviewed nineteen ultrasound studies using a specially designed audit tool. The level of agreement between sonographers was assessed. Correlation with study difficulty, reviewer grade and length of experience was made.

**Relevance:** With the introduction of external accreditation, assessment of image quality in ultrasound will become more widespread. Peer-to-peer audit is rarely utilised among sonographers, but is a potentially useful tool in auditing ultrasound image quality.

**Outcomes:** Agreement between sonographers was good. Length of clinical experience had no effect on inter-rater agreement. Those of a higher clinical grade scored ultrasound studies significantly lower. There was strong correlation between study score and study difficulty.

**Discussion:** This study demonstrates that sonographers are in broad agreement when rating ultrasound studies. Length of clinical experience should not be a barrier to participating in this process. Experience with peer-to-peer audit is positive, deepening the involvement in the audit process and allowing professionals to benchmark their performance against their peers benchmark their performance against their peers.

**P-108 How long is long? A prospective study of a longitudinal couch setting in pelvic patients receiving a course of radiotherapy**

*Dee-Anne Thomas; Simon Goldsworthy,  
Beacon Centre*

**Introduction:** A couch longitudinal deviation had been observed in many patients, resulting in a manual override in the Mosaiq® sequencer. It was suggested that this was due to the soft foot rest on the Combifix™, which could allow for a daily deviation of 1 -2 cm. A couch long setting was proposed as a solution.

The aim of this study was to evaluate the proposed longitudinal setting before and after implementation using geometric displacements on treatment as the outcome measure.

**Method:** At CT simulator a measurement was recorded from an index point on the ibeam® evo couch top to the patients anterior and lateral tattoos, and this longitudinal setting used daily on treatment.

Patients were eligible if they have had five previous scheduled images before implementation with five more scheduled after. Geometric displacement: Systematic and random errors of the selected patients were assessed before and after implementation.

**Result:** 17 pelvic patients were selected with an age range of 50 – 80 years with diagnosed prostate and gynaecological cancers. 76% had a longitudinal override before implementation of the couch long setting, and 0% after.

	Before implementation			After implementation		
	Vertical	Lateral	Long	Vertical	Lateral	Long
$\Sigma_{pop} =$	2.9 mm	2 mm	1.6 mm	1.5 mm	1.4 mm	1.3 mm
$\sigma_{pop} =$	1.9 mm	2 mm	1.9 mm	1.4 mm	1.7 mm	1.6 mm

**Discussion:** Setting an absolute longitudinal setting on a daily basis reduced the set up deviation. The systematic and random errors were lower in all directions after the implementation of a couch longitudinal setting. A particular difference was noted in the vertical direction as shown in table 1. A change in practice is recommended based on the results of this small study.

**P-109 “Walk-in” service for the emergency department: impact on the management of scaphoid wrists**

*Lauren Banks; Jan Kennedy;  
Inhealth*

The snow led to an increase in wrist injuries with an increase in referrals for scaphoid MRI and no time allocation for these appointments. Walk-in slots were created during the day to alleviate the pressure. The dept ran the risk of losing slots for pre-booked appointments. The impact being our 2-week waiting time may be breached. We are already scanning approx 788 patients a month with the dept open 7 days a week (0800-2000 and 0800-1800).

We checked the available slots at the end of each day and week to see how effective the walk-in slots were. The most important factor, was there an impact on the 2-week waiting list?

The scaphoid protocol is shorter than a normal routine wrist protocol and takes 8 minutes to run. Patients were asked to wait or offered a walk-in appointment of their choice. All patients were scanned within a week.

In February 1 fracture detected on X-ray, 14 on MRI.

In March 3 fractures detected on X-ray, 6 on MRI

In April 2 fractures detected on X-ray and 8 on MRI, 28 patient treatments changed. 20 of the 28 fractures were treated immediately

The results showed that no appointment slots were lost; there was a more efficient use of appointment timings due to cancellations and DNA slots being filled by the walk-in service. Injuries

were picked up early in the patient's pathway leading to earlier effective treatment plans and injury stabilization.

**P-110 Audit of lumbar spine radiograph requests from GP's: are we meeting NICE guidelines?**

*Michael Cooke; Emma Rowbotham; Constantinos Tingerides,*

*Leeds Teaching Hospital Trust*

**Objectives:** Chronic low back pain is a common complaint amongst patients presenting to both primary care and musculoskeletal services. At present many of these patients are referred for lumbar spine plain radiographs which are of little diagnostic value (NICE) and result in exposure to a significant radiation dose (3.7mSv). The aim of this audit was to gather evidence to support a significant reduction in the number of lumbar spine film requests and improve the overall referral process.

**Content:** A retrospective analysis of 120 GP referrals for lumbar spine radiographs was carried out in September 2011 over a one week period. Requests were grouped into categories according to NICE guidelines. Data were analysed using SPSS version 19.

**Impact**

Reduction in radiation exposure to patients

Reduction in the number of unnecessary plain film appointments

Reduction in costs associated with the investigation of long term non-specific low back pain

**Outcomes:** 81% of referrals for lumbar spine radiographs did not meet the guidelines set out by NICE. 63% of referrals had no indication for any imaging. Data are to be discussed at the next local audit meeting and discussions around the most appropriate way to deliver the message to GP's as well as a reduction in the number of requests fulfilled by radiographers is under consideration.

**P-111 CT colonography diagnostic performance in four district general hospitals**

*Marc Williams; Milan Sapundzieski;*

*Fairfield General Hospital, Pennine Acute Hospital NHS Trust;*

**Aim:** to assess the diagnostic performance of CT colonography in detecting colorectal neoplasia and polyps across four district general hospitals in the UK.

**Methods:** CTC reports from all four sites over a one year period were analysed. CT findings recorded included colorectal neoplasms, polyps measuring < 6mm, 6-9mm and > 9mm. The use of faecal tagging was also noted. CT findings from the reports were compared to colonoscopy report findings (gold standard) if available. True positive and true negative data was recorded using an excel spreadsheet. Sensitivities and positive predictive values were calculated.

**Results:** a total of 522 CTC reports were analysed. 254 had comparable colonoscopy report findings. 178 of CTCs used faecal tagging, 344 used no faecal tagging. The sensitivities for each CT finding are as follows, colorectal neoplasms (100% sensitivity, PPV 1.0), polyps > 9mm (83% sensitivity, PPV 0.71), polyps 6-9mm (93% sensitivity) and polyps < 6mm (26% sensitivity). No significant difference in sensitivity was found between CTCs that used faecal tagging and those without faecal tagging in detecting colorectal neoplasm and large polyps. However for smaller polyps < 6mm CTCs that used faecal tagging recorded a higher sensitivity (50%) compared to CTCs without faecal tagging (23%).

**Conclusion:** overall diagnostic accuracy of CTC across four UK district general hospitals in detecting colorectal neoplasm and large polyps showed to be excellent and supported its role in colorectal cancer screening. The use of faecal tagging appears to be helpful in detecting smaller polyps.

**P-112 Re-audit of imaging in prostate cancer patients: are we scanning more of the right patients?**

*Sam Dumonteil; Ramin Mandegaran; Giles Rottenberg; Declan Cahill;*

*Guy's and St Thomas' NHS Foundation Trust*

**Purpose:** A diagnosis of prostate cancer following TRUS guided biopsy frequently leads to related imaging, particularly bone and MRI scans. Local guidelines created in late 2009 define criteria based on risk factors to determine which patients with prostate cancer would benefit from further imaging. The aim of the study was to assess the effectiveness of these guidelines.

**Methods:** All men undergoing prostate biopsy in 2009 and 2010 had their electronic records examined to determine the result of their biopsy. Men with a diagnosis of cancer had their records searched for all related imaging and data was collected on risk factors for metastatic disease including PSA level and Gleason score.

**Results:** 613 patients underwent a prostate biopsy. 386 (63%) men were diagnosed with prostate cancer, 197 (51%) underwent a bone scan and 260 (67%) had an MRI scan. Since local criteria were created in 2009 the proportion of bone scans meeting the criteria increased from 69% to 88%, while MRI scans meeting criteria improved from 55% to 61%. The absolute number and proportion of men undergoing bone scans also fell from 108 (34%) in 2009 to 89 (29%) in 2010.

**Conclusion:** The proportion of men undergoing inappropriate bone and MRI scans has reduced since the implementation of local guidelines. Furthermore the number of bones scans carried out has also been reduced. Unnecessary bone scans and related imaging leads not only to potentially avoidable radiation exposure but also constitutes a significant cost to the health service which given the current financial climate it can ill afford.

#### P-113 **Radiology services provision at the games of the XXX Olympiad**

*Peter Chapman; Jon Crighton; Anish Patel; Jalpesh Jethwa;  
Peninsula Radiology Academy*

##### **Aims/ Objectives**

To present an overview of the imaging services provision at the Games of the XXX Olympiad.

**Content:** A review of the planned radiology services across the various venues of the 2012 games.

**Relevance/Impact:** The role of radiology is central to the successful provision of world class sports medicine. In this poster we outline the planned radiology services for the 2012 summer Olympic games.

**Outcomes:** A better understanding of the central role of imaging in the successful delivery of a world class Olympic games.

#### **Education/Training**

##### P-114 **Are radiology reports read and acted on?**

*Nevine Anandan; Carl Sullivan; Sharon Evans;  
Morriston Hospital, Swansea*

**Relevance:** A request by the Ombudsman to the Hospital Trust Directors followed an occasion where a patient underwent a radiological investigation from which concern was raised in the radiology report. The referring clinician failed to act which resulted in significant harm to the patient.

##### **Objectives:**

- 1) Assess if radiology reports are read and acted upon by referring health professionals.
- 2) Identify clinical areas which do not meet the standard (100%).
- 3) Discuss ways improve outcomes.

**Methods:** Retrospective audit of 100 patients, from 20 clinical areas across specialities. Assess for presence of clear documentation of the radiology report and subsequent management.

##### **Results:**

1 <sup>st</sup> Cycle	Number of cases	Reports documented	Management documented

Acute areas	20	95%	95%
Out-patients	40	85%	98%
In-patients	40	75%	90%
<b>Total</b>	<b>100</b>	<b>85%</b>	<b>94%</b>

2 <sup>nd</sup> Cycle	Number of cases	Reports documented	Management documented
Acute areas	20	85%	100%
Out-patients	40	95 %	92.5%
In-patients	40	90%	95%
<b>Total</b>	<b>100</b>	<b>90%</b>	<b>96%</b>

**Conclusion:** Following the 1<sup>st</sup> cycle, changes were implemented and the 2<sup>nd</sup> cycle performed 12 months later. The 2<sup>nd</sup> cycle results show that the implemented changes were effective; Overall, there was an improvement in documentation. The standard of 100% was achieved in the acute areas for documenting management following radiological investigation. Although there was no improvement in overall in-patient results, it is important to note that **all** patients with significant pathology had appropriate management documented.

Possibilities for future improvements include:

A system of in-built report acknowledgement into the existing PACS system.

Direct Radiologist organisation of appropriate investigations/referrals.

#### P-115 **Skeletal reporting by radiographers: a review of 27800 cases**

*Keith Piper, Canterbury Christ Church University*

**Aim:** To analyse the objective structured examination (OSE) results of 11 cohorts of radiographers (n=278) who completed an accredited postgraduate programme in reporting of appendicular and/or axial skeletal examinations.

**Content:** 100 skeletal examinations were used in each appendicular and/or axial OSE, which included the following appearances: trauma/arthritis/tumour/ infection/metabolic/congenital/miscellaneous conditions/incidental findings and/or normal variants. The prevalence of abnormal examinations approximated 50%. Radiographers a) noted if an examination was normal or abnormal (b)described the abnormal appearance/s and (c)indicated the most likely pathology/pathologies present. Sensitivity, specificity and total % agreement rates (and 95% confidence intervals) were calculated using all reports (n=27800) for the first 11 cohorts, recruited nationally between 1998 and 2010.

**Relevance:** To review the standards achieved and compare appendicular/axial OSE performance rates.

**Outcomes:** The mean sensitivity, specificity and agreement rates; and 95% confidence intervals, for the 278 radiographers were: appendicular; 95.9% (95.4% - 96.3%); 96.5% (96.0% - 96.9%); and 95.1% (94.7% - 95.4%); axial; 95.6% (95.1% - 96.1%); 94.4% (93.8% - 94.5%); and 94.1% (93.8% - 94.5%) respectively. Although, no significant difference was demonstrated (p=0.41) between the sensitivity rates, the appendicular specificity and agreement rates were both significantly higher (p<0.001). The

appendicular rates all improved (1.5% - 4.0%) and this trend increase was significant ( $r=0.75$ ,  $0.63$ ,  $0.59$ ;  $p<0.05$ ). The trend improvement for axial rates was significant for specificity ( $r=0.82$ ,  $p<0.01$ ) but unchanged at 95% and 94%, respectively, for sensitivity and agreement rates.

**Discussion:** The results confirm that radiographers can report both appendicular and axial examinations to a high standard and that wider implementation is indicated.

**P-116 Radiology competence; Trust me, I'm a junior doctor!**

*Jen-jou Wong, Azadeh Taheri;  
University Hospital Aintree*

**Purpose:** As early as the first week in post, the newly appointed house-officer is expected to detect abnormalities, correctly interpret and develop action plans when reviewing plain radiographs. During on-call duties, circumstances often dictate that the house-officer may be required to act promptly without senior advice being readily available, for example in patients with compromising pneumothorax. This study was designed to assess the radiological competence amongst foundation trainees and final year medical students. Competence was defined as detecting obvious "life or death" abnormalities with misinterpretation having a potential bearing on patient safety and outcome.

**Material/Methods:** A mix of 73 foundation trainees and final year medical students were shown radiographs depicting: tension pneumothorax, pneumoperitoneum, dilated small and large bowel loops, incorrect NG tube placement. The correct recognition of the aforementioned diagnoses constituted a 'competent' candidate. A large pleural effusion, large atelectasis, fracture of the neck of femur, consolidation and surgical emphysema. Correct recognition of these additional films was deemed as 'satisfactory' basic radiology knowledge. The candidates were asked to pick the most appropriate diagnosis from a list of 30 possible answers.

**Results:** 65% of second year and 45% of first year foundation trainees and 30% of final year medical students achieved core competency. However 100% of candidates detected that there was an abnormality and stated that they would seek senior advice regarding further management.

**Conclusions:** This study highlights significant room for improvement in the performance of undergraduates and foundation trainees in interpreting important specific diagnoses. Encouragingly, an abnormality was recognised in all cases. The lack of specificity about particular diagnoses has potential critical implications on the day-to-day running of the wards and initial management of acute admissions.

**P-117 Assessment of the effect of clinical rotation in radiology on medical students' awareness level of ionising radiation and radiation protection**

*Sarah Haqj, Mawya Khafaji;  
King Abdulaziz Univesity Hospital*

**Purpose:** Doctors' knowledge of ionising radiation and radiation protection is very vital specifically when requesting radiological investigations that involves patients' exposure. A cross-sectional study was conducted to evaluate medical students' awareness of ionising radiation after their clinical rotation in the Department of Radiology at King Abdul-Aziz University (KAU), Jeddah- Saudi Arabia..

**Methods:** A self-administered structured questionnaire was used to collect data from final year undergraduates after completion of their clinical rotation in the Department of Radiology. Results: Out of the 447 sixth-year medical students at KAU in 2010, 326 (73%) chose to participate in this study and represented the main study population. Nearly 38% of the students thought that objects in the room would still emit radiation after completion of the exposure. Only 42% knew that intravenous contrast material used in angiograms is not radioactive. Twenty-five percent of the students underestimated the Computed Tomography (CT) exposure dose. More than 50% of the students thought that magnetic resonance imaging (MRI) involves ionizing radiation. On the overall questionnaire, 163 students (47%) scored above 60% , which is considered the passing score.

Thirteen (4%) students got all their answers wrong and scored zero. Only 22 students (7%) scored over 85%.

**Conclusion:** The results highlight deficiency of doctors' knowledge with regards to ionizing radiation and radiation protection and modifications to the existing curriculum should be considered to minimize unnecessary exposure of patients and the community to radiation.

**P-118 Radiology training in the UK - a survey of trainee opinion**

*Andrew Yeung; Sylvia Worthy;*

*Department of Radiology, Royal Victoria Infirmary, Newcastle upon Tyne*

**Aims/Objectives:** To present the findings of a national survey of radiology trainees in the UK. To link this in with an overview of current 'hot topics' in UK radiology training.

**Content:** A national survey of UK radiology trainees was conducted. Invitations were sent out to UK radiology trainees to survey their views on the current radiology training landscape. The areas covered included: eportfolios, the new radiology curriculum, annual review of competence progression (ARCP), European working time directive (EWDT), radiology schools, consultant positions, national recruitment and interdeanery transfers.

**Relevance/Impact:** Radiology training is undergoing significant change with a greater emphasis on attainment of competencies and the evidence required to demonstrate these. Significant changes are also occurring at the recruitment stage with the development of national recruitment. This presentation aims to provide an overview into the components affecting radiology training today. The results of our survey will be presented to provide a snapshot of the trainees' views on these developments.

**Outcomes** Trainees find the eportfolio a useful tool and most found it easy to use although a number of concerns were raised about the new curriculum. Most trainees (69%) found the ARCP process worked well in their deaneries and had a good understanding of the process. The impact of EWDT on training caused considerable polarisation of trainee opinion.

**Discussion:** This presentation provide an insight into the changing landscape of radiology training in the UK and combines delivering the results of our trainee survey with an overview of the changes in question.

**P-119 Can a short intensive learning experience abroad provide benefits to a student's development?**

*Susan Norton; Elaine Norton; Amanda Rogers; Sana Khalid; Prasanna Byrarapu;*

*University of Salford*

**Aim:** To reflect on students experiences from a short intensive learning experience abroad

**Content:** Four second year Radiography students from the University of Salford participated in a pilot curriculum development opportunity to create a research in teaching experience (RITE 2) for a BSC honours Diagnostic Radiography programme. To extend this pilot research the students and one lecturer spent a week in Switzerland undertaking research into image interpretation. This poster reflects on their experiences and perceived benefits from this opportunity using Kolb's model. Conclusions were drawn from a debriefing session and a presentation that these students gave to a cohort of their peers.

**Relevance:** Not all students can commit to a period of 3 months away from their responsibilities at home.

**Outcomes:** Some of the main benefits were improvement in research skills such as data analysis, presentation of the findings. In addition secondary benefits such as improvement in communication skills were also identified. The students also experienced a different model of Healthcare provision to the British one as part of the visit.

**Discussion:** In conclusion the four students who participated in this experience would not have been able to participate in the usual length of study experience offered. There is a place for shorter visits,

exchange schemes should consider offering funding for shorter exchanges to widen the opportunity to more students.

**P-120 Communication and patient diversity**

*Gemma Lynes, Zainab Hussain*

*University of Liverpool*

**Aims:** The aim of this study was to review literature of the issues involved with regard to communicating effectively with patients who have a hearing or visual impairment or who are not fluent speakers of English.

**Content:** A review of the literature regarding communications and service delivery in the NHS and patients who are hearing or visually impaired or who are non-fluent speakers of English. Policies and procedures from a number of NHS trusts were also reviewed to locate the availability of staff training and diversity and equality. This training was not mandatory and also did not include communication skills and patient diversity.

**Relevance:** The National Health Service describes itself as an organisation in which equality and diversity are at the heart of its NHS strategy. Equality relates to fairness and developing practices and policies that recognise and address inequality. Diversity is about recognising and valuing the multiple differences and rights of all sections of the community and also addressing the multiple inequalities, disadvantages and discrimination experienced by these sectors of the community. However despite this and also past and recent legislation regarding race and disability there are still reported deficiencies regarding effective communication and patient diversity.

**Outcomes:** NHS Trusts provide a policies regarding use of interpreters and also have policies regarding the availability of patient information in differing formats. However there was no training provided for communication skills and patient diversity. The literature available does report that there are significant problems regarding effective communication with patients who are visually or hearing impaired or are non-fluent speakers of English. Interpreter services are still limited, especially in the emergency setting.

**Discussion:** NHS Trust policies are very important, as the NHS must comply with current legislation such as the Equality Act 2010 however staff need to be adequately trained in the implementation of policies and this should be addressed by the Trust and also and also embedded into the curricula for medical and allied health degree programmes.

**P-121 Too much imaging; think Munchausen's**

*Nick Ridley; Victoria Brown; Katie Bayley;*

*The Great Western Hospital*

**Aims/Objectives:** We aim to increase awareness of the excess use of Imaging as a dominant feature of Munchausen's Syndrome. We present two patients with Munchausen's syndrome who attended on multiple occasions, resulting in a large number of Imaging tests performed unnecessarily. At no stage was there any evidence of significant underlying abnormality.

**Content:** Patient A: 35 year old female with 181 presentations to the Emergency Department. Over a nine year period the patient presented to the imaging department on 80 occasions. This included 7 CT's 1 Barium Enema, 1 IVU, 1 Small bowel meal, and multiple plain films. Patient B: 36 year old male with 42 presentations to the Emergency Department. Over a 4 year period the patient presented to the imaging department on 46 occasions. This included 6 CT's, 8 MRI's, and multiple plain films.

**Relevance/Impact:** If unrecognised patients with Munchausen's syndrome can present on multiple occasions to the Radiology department. Not only does this result in a large amount of unnecessary imaging, the high radiation dose can be dangerous. Radiology staff need to be aware of this syndrome and work carefully with their clinical colleagues to manage these patients appropriately.

**Outcomes:** Once it was realised that both patients were fabricating their illness and obtaining unnecessary investigations, not only from our institution but several others, an electronic alert was



placed on each patient's file and staff educated accordingly. If any further investigations are required then this has to be by consultant only.

**P-122 Audit of radiographer practice in performing stereotactic wire localisation procedures prior to surgery in the UK**

*Amrita Kumar; Furhan Razzaq; Helen Chambers; Virginia Higgins;  
Warrington & Halton Hospitals NHS Foundation Trust*

**Purpose:** To assess the effectiveness of radiographers in their performance of stereotactic wire localisation procedures.

The increasing number of women being screened annually, together with the widespread practice of double reporting has led to an incremental increase in the workload of the NHS Breast Screening Programme without a corresponding rise in radiology manpower. The concept of skill mix has entered and been supported by the NHSBSP to free up the radiologist from work that could be performed by radiographers with appropriate training. This also allows the radiographers to build on their professional development which leads to greater job satisfaction. In order to carry out this procedure radiographers are required to follow the British Association of Surgical Oncology (BASO) guidelines that state that in >95% of cases, the tip of the localisation wire should be within 10 mm of the lesion in any plane.

**Methods:** A retrospective study was carried out on radiographer-led stereotactic wire localisations over a two-year period (Jan 2009-March 2011). This identified 61 patients who underwent this procedure with a total of 67 wires. The procedures were carried out by two senior appropriately trained radiographers.

**Results:** Of the 67 wires, 66 (98.5%) wire localisation tips were within 10 mm of the lesion in any plane. Statistical analyses with chi-square test revealed the presence of clinical significance with a p value < 0.001.

**Conclusion:** Wire placement within breast lesions prior to surgical excision by radiographers has been shown to be safe and effective practice which meets and exceeds the guidance set by the BASO.

**P-123 Radiographers' experience of violence and aggression in a major South Wales accident and emergency department**

*Hywel Rogers; Chloe Bowditch;  
Cardiff University*

**Background.** Violence & aggression in the workplace is a growing problem worldwide. The healthcare sector is particularly affected with staff in the accident & emergency (A&E) department being the most at risk. Investigation has centred on medical staff in particular with a distinct lack of research regarding radiographers. The aim of this study was to gather the opinion of radiographers on their experience of violence and aggression in A&E.

**Method.** The sample was chosen by use of convenience sampling, thus the sample group consisted of all radiographers (n=31) in a major trauma centre in South Wales. The data was collected by a self administered questionnaire and good internal consistency reliability was found using Cronbach's alpha test. The questionnaire was piloted and readability issues were rectified for the final questionnaire. Face and content validity were assured by the use of a focus group and reviewing appropriate literature.

**Results.** 94% (n=29) of respondents had experienced violence & aggression at least once. Also it seems that radiographers have little knowledge of the Welsh Assembly Government violence & aggression passport. In addition, some respondents (n=19) felt that training should have an increased "hands on" approach and only 12 respondents reported high confidence of dealing with physical aggression following training.

**Conclusions.** The study shows that violence & aggression is an alarming issue for A&E radiographers and is a greater problem than has been found previously. Additionally, it appears that even with training, there is a low level of confidence in dealing with physical violence.

**P-124 Ethics in radiology: a gap in the specialist training curriculum?**

*David Minks; Jeremy Jones; Kshitij Mankad; Daniel Sokol;  
Leeds Radiology Academy; Leeds General Infirmary; Imperial College London;*

**Introduction:** Ethical issues regularly present in daily radiological practice. Our aim was to investigate radiology trainees views on radiology ethics and its teaching on the specialty training curriculum.

**Methods:** An online survey was disseminated to trainees nationally. Data was collected over six weeks during February and March 2011.

**Results:** 59 trainees from 18 training schemes completed the questionnaire.

Would training in various aspects of radiology ethics be a useful measure?

Strongly agree	5
Agree	31
Neutral	13
Disagree	8
Strongly Disagree	2

Over 60% agreed that training in radiology ethics would be useful. However, little over a quarter had received any ethical training and less than a third of these had undertaken formal teaching. 4 had received formal training in radiology ethics, 10 had informal training, and 45 had not received any training. Only 12 responders were aware an ethics curriculum was incorporated into their training.

**Discussion:** Teaching consisted of small group discussion, lectures by radiology staff or medical ethicists. Only 20% thought ethical training represented part of the curriculum and 97% were unsure if there was a lead for ethics in their training scheme. Our survey shows that most trainees believe the RCR ethics curriculum topics and non-curriculum topics are of interest and useful, but most have not received training and believe that it would be beneficial. We suggest that each training scheme considers appointing a lead in ethics teaching, who can investigate the need for introducing an ethics curriculum.

**P-125 Oncall CT scanning- recent trends seen in a district general hospital and the implications for radiology service provision in the future**

*Reena Dwivedi; Nabile Mohsin;  
St Helen's and Knowsley NHS Trust*

CT scanning out of hours with immediate reporting has been recognised as an important step with in the management pathway of emergency patients. However, this has to be accommodated within the European Working Time Directive for radiology trainees.

Within our District General Hospital there has been a subjective increase in the number of CT scans performed out of hours.

We present an audit to assess the burden of oncall CT scanning and how it has changed over the last three years. We also evaluate effect on registrar training from the number of sessions lost by trainees. Potential options to enable a more economically efficient and trainee-friendly service are explored.

**P-126 Non-ketotic hyperglycaemia associated hemichorea-hemiballismus (HC-HB)**

*Zahia Zaitout, Ruth Batty; Kavitasagary Karunasaagarar; Sheetal Gagrani; Daniel Connolly;  
The Neuroradiology Department, The Royal Hallamshire Hospital, Sheffield; Paediatric Radiology Department, Sheffield Children's Hospital; Worcestershire Acute Trust;*

Hyperglycemia associated with hemichorea-hemiballismus is a diagnosis that has been described in the medical literature. It was reported as the presenting symptom of new onset diabetes, with type 2 and rarely with type 1 diabetes. However, this condition is relatively under-recognised by clinical radiologists. It can give unilateral hyperdense basal ganglia on CT and it is part of the differential diagnosis for high T1weighted signal in the basal ganglia. On magnetic resonance imaging there is a limited differential diagnosis for pathologies presenting with T1 weighted spin echo hyperintensity within the central nervous system in general and the basal ganglia in particular. The aim of our poster is to explore the pathological process and provide computed tomography and magnetic resonance image illustrations of three different clinical cases of non-ketotic hyperglycemia associated hemi-chorea-hemiballismus.

**P-127 Nasogastric tubes in critical care**

*Matthew Newport; Marc Williams;*

*Fairfield General Hospital; The Pennine Acute Trust;*

**Objectives:** NG tubes are essential in critically unwell, sedate or ventilated patients. National Patient Safety Agency (NPSA) publications in 2005, 2009/10 and 2011 have identified NG misplacement as a 'never ever' event. Audit undertaken to assess the quality of plain film requests for NG placement, the protocol for checking placement clinically and the equipment in use. The standard educational training for junior doctors was also assessed. 35 ITU/HDU radiology requests for NG placement were assessed over a 10 month period.

**Results, Relevance & Impact:** Only 57% of the plain films visualised the NG tube to be in the correct position. Of the remaining 43%, it was uncertain where the tube lay in 63% of cases. The remaining 47% (6 placements) were incorrectly placed in the lungs. NG tubes and pH paper were found to be noncompliant with NPSA standards. There is no formal or informal teaching for junior doctors in the interpretation of plain films for NG placement checks. Relevance- Education of junior medical staff into radiological interpretation. Patient safety area, highlighted by the NPSA, with evidence of persistent patient harm nationwide.

**Outcomes:** NPSA safety alert is displayed prominently in the ITU/HDU department. Focus on clinical confirmation of NG placement before radiological confirmation has ensued. Flow chart to assist medical staff in interpreting images displayed prominently in the department at the monitor where such images are interpreted. Foundation Doctors are now undertaking a relevant online module as part of their induction program in the hospital.

**P-128 CT urography- often used but frequently misinterpreted**

*Kirsty Wilde; Vincent Helyar; Zaid Viney; Giles Rottenberg;*

*Department of Radiology, Guys hospital, Guy's and St Thomas NHS Foundation Trust, London*

CT Urography (CTU) has become a standard investigation in the evaluation of the upper urinary tract. Reporting techniques and experience vary amongst radiologists. This poster aims to educate radiologists who report these examinations by highlighting pitfalls in reporting.

A retrospective review of the discrepancies added to the PACS folder over the past 4 years was made.

Discrepancies included missed ureteric and renal tumours, as well as missed stones. Extra renal abnormalities were also missed, and included lung metastases, and colonic tumours. The poster will highlight the types of discrepancies, and demonstrate how they can be avoided, and will include tips on reporting techniques, and post processing

**P-129 Artifacts in MRI – back to basics**

*Shalini Wijesuriya; Mani Thyagarajan;*

*Musgrove Park Hospital, Taunton; Bristol Royal Hospital for Children;*

**Aim:** A reminder of the different types of MRI artefacts and the physics behind why they occur.

**Content:** We present a comprehensive pictorial review of different types of patient-related and signal-processing related MRI artefacts. We explain why they occur, their imaging features on MRI and methods used to reduce the likelihood of them occurring.

**Discussion:** The use of MRI in the investigation and surveillance of patients has increased dramatically over the years. Its main advantages include the lack of radiation and high quality images. However, one of the key disadvantages is the presence of artefacts, which commonly occur. These can be broadly divided into patient-related artefacts and those related to signal processing. Common patient-related artefacts include those related to patient motion, pulsatile flow and in situ metalwork. These can cause ghost images, spatial misregistration or distortions in the magnetic field, all of which may make image interpretation difficult. Signal-processing artefacts include chemical shift, partial voluming, wrap-around and Gibb's phenomenon, just to name a few.

**Relevance:** The physics behind artefacts can be very complicated and many shy away from understanding them. However, it is essential that radiologists and radiographers are aware of the underlying principles and their imaging features as they can potentially mask, or even be confused with true pathology.

**Outcomes:** We hope that this series will serve as a reminder of the different types of MRI artefacts that we encounter in our daily practice and increase confidence amongst radiologists and radiographers, notably trainees, in correctly interpreting them on imaging.

#### P-130 **Understanding the tools of the trade, from amplatz to zenith**

*Amit Goyal; Katherine Augustine; Shalini Wijesuriya; Tim Ward;  
Musgrove Park Hospital NHS Trust*

The Royal College of Radiologists has recently introduced interventional themed speciality training posts to address a change in the way common diseases are managed, in particular vascular diseases (1). Streamlining trainees begins with early exposure to interventional procedures and compiling a record of experience akin to a surgical logbook.

Learning begins by observing, then progresses with supervision to performing independently. In our experience the greatest hurdle to trainees, lies in awareness of the multitude of interventional devices available and understanding how to best manipulate these to achieve the desired result. We present an educational guide demonstrating basic conventional vascular interventional instruments and how they can be used to negotiate common obstacles and complexities. We discuss the evolution of the 'guide wire' from selective catheterisation first described by Dotter and Judkins (1) to composite recanalisation devices used across most UK centers today.

Although interventional technique is best learnt by practical experience, we believe this article will provide an invaluable insight into the strategy employed by current practitioners.

#### **Ref:**

1) The Royal College of Radiologists. Standards for providing a 24-hour interventional radiology service. London: The Royal College of Radiologists, 2008.

2) Dotter CT. Cardiac catheterization and angiographic technics of the future. Background and current status of clinical catheter angiography. *Cesk Radiol* 1965;19:217–36

#### P-131 **A radiological repast: a gastronomic foray into food signs in radiology**

*Sakthivel Gnanasambandam; Matthew D Bull; Praveen Konala; Tarig Adlan; Hazan Nizami;  
David Gay*

*Derriford Hospital NHS Trust, Plymouth*

**Aims:** Radiology, like the rest of medicine, is full of weird and wonderful terms for various diseases, signs and features. Food stuffs are commonly encountered in radiology parlance, and often allow us to more easily remember the conditions to which they apply. In this poster we illustrate and discuss various food signs with radiological descriptions and underlying the pathologies implied by these findings, in the format of a restaurant menu with correlative images. By using a fun as well as educational approach, we hope that the radiologist may more easily recall the signs, and the associated differentials, thus aiding with reporting of images.

**Content:** A restaurant-style menu comprising including foods commonly encountered in radiological descriptions.

**P-132 Evidence based practice in radiography: nephrogenic systemic fibrosis- a case in point**

*Sharon Stewart, Glasgow Caledonian University*

**Aims/ Objectives:** This poster will outline the importance of evidence-based practice in radiography using NSF as a case study.

**Content:** Define NSF and the historical context of this disease. Explain the importance of Clinical Effectiveness & Evidence based practice. Outline the role of the radiographer regarding the safe use of gadolinium contrast agents in light of the serious and life-threatening risk of nephrogenic systemic fibrosis. Discuss the evidence radiographers can review to ensure they are practicing evidence-based medicine/radiography.

**Relevance/Impact:** Radiographers have extended their role to include administering contrast injections in MRI examinations. To protect their patients from harm, and themselves from litigation, radiographers require ensuring they are up-to-date.

**Outcomes:** Evidence based practice (EBP) is an essential requirement for radiographers, and NSF is a classic example to emphasise why we need to understand and implement EBP

**Discussion:** Radiographers are autonomous and accountable practitioners who require to use the evidence base to inform practice and ensure high standards of patient care.

**P-133 Pearls and pitfalls in interpretation of PET CT scan**

*Uma Viswanathan Nair; C Bell; R Hanlon; H Wieshmann;  
University Hospital Aintree*

18-F FDG PET CT is used routinely in the diagnostic work up of oncology patients. As with other imaging modalities FDG PET CT can reveal expected and unexpected findings including image artefacts. It is vital that the radiologists involved in MDT's are familiar with the normal appearances, incidental findings and their relevance with regards to management of patients. There are benign conditions which can be FDG positive on PET CT and cause diagnostic dilemma and there are certain neoplasms which are not associated with increased metabolic activity resulting in false negative studies. This pictorial review aims to familiarize the general radiologists and trainees with the diagnostically challenging imaging patterns including artefacts which we have come across in our clinical practice.

**P-134 Pseudo subarachnoid haemorrhage - a diagnostic quandary**

*John Emelifeonwu, Joseph Lang;  
University Hospital of Wales*

Early computer-assisted tomography (CT) of the brain is the cornerstone of diagnosing subarachnoid haemorrhage (SAH) and hyperdensity in the basal cisterns and subarachnoid spaces on unenhanced CT scan is a characteristic finding. However, several radiological mimics of these appearances have been reported in the literature. These 'pseudo SAHs' can be caused by a wide range of conditions including diffuse cerebral oedema and high density cerebro-spinal fluid secondary to intra-thecal contrast. Here, we present one such case of 'pseudo SAH' secondary to pyogenic meningitis and describe a range of conditions that can produce this interesting radiological finding.

**P-135 Non-small cell lung cancer in 15 year old child presenting as pneumothorax with an incidental peripancreatic cystic lymphangioma**

*Zahia Zaitout, Win Thuzar*

*The Neuroradiology Department, The Royal Hallamshire Hospital, Sheffield; Paediatric Radiology Department, Sheffield Children's Hospital;*

Primary lung neoplasm in the paediatric population is a rare occurrence. Secondary metastases represent a large proportion of paediatric malignancy. There has been few case reports of lung

cancer presenting with pneumothorax in the adult population. However, to the best of our knowledge paediatric non small cell lung cancer presenting with pneumothorax has not been described. Our patient also had an incidental abdominal lymphangioma as double pathology, which is on its own uncommon in all age groups. We present the chest radiographs, US and CT findings of 15 year old male patient, who presented with left sided pneumothorax due to underlying malignancy with histologically confirmed non small cell lung cancer and abdominal (peripancreatic) cystic lymphangioma.

**P-136 Pictorial review of the less common sites for malignant melanoma metastases seen in our regional centre (over a four year period)**

*Benjamin Pinkey; John Herbert; Andrea Howes;*

*St Helens and Knowsley NHS Teaching Hospital Trust; Countess of Chester Hospital;*

**Aims:** This pictorial review aims to demonstrate the wide variability of melanoma metastases

**Content:** This pictorial review demonstrates our local experiences of metastatic melanoma. There is a wide variability in where melanoma can metastasise to. In this review we will give illustrations of some of the less common extra nodal sites. Images will be from common cross sectional modalities including CT, PET-CT and MRI.

**Relevance:** Malignant melanoma is an aggressive skin cancer that routinely metastasises. There has been a well publicized increase in the number of melanoma cases seen each year in the UK. We work in a regional skin cancer centre which is one of the largest in the UK. During patient's initial work up and subsequent follow up care they undergo numerous radiological investigations which we are asked to report or review (CT, PET-CT, MRI).

**Outcomes:** Cases were acquired over a four year period by going through old MDT lists. The skin cancer MDT occurs weekly. Patients with both common and rare sites of metastasis had their imaging reviewed. Specific cases were then carefully selected to demonstrate the appearance and site of melanoma metastases. Whilst sites such as liver and lung are common, we aim to show some of the less common sites encountered many of which have been histologically confirmed.

**Discussion:** This pictorial review aims to be an aid memoir to all radiologists and clinicians dealing with melanoma. It demonstrates the wide variability of melanoma metastasis and emphasises that melanoma can essentially metastasise anywhere.

**P-137 Pictorial essay on the radiology of knee swellings**

*K Prescod; Z Al Ani; Joseph Alex; E Kweka;*

*North east Lincolnshire and Goole NHS; Manchester Radiology training scheme;*

**Aims/objectives.** Anatomic –radiologic description of knee pathology presenting as swellings

**Content:** Classically, in the clinical examination of a lump, certain clinical features would lead a medical practitioner to a relatively accurate diagnosis. With further advances in musculoskeletal radiology, we look at a variety of common masses that can present around knee with a look at the typical imaging findings correlated across the modalities and differentials to be considered. An emphasis on the radiologic- clinical correlation and anatomy is made. From tumors as simple as ganglions and effusions to synovial chondromatosis and malignancies are described pictorially.

**Relevance.** The cardinal features of site, size, shape and dynamic features such as sensitivity and mobility are essential in the radiologic evaluation and diagnosis of knee swellings. This is a good guideline to all clinicians in evaluation and referral of knee tumors.

**P-138 Knee MRI scan requests from primary care - an audit following introduction of requesting guidelines**

*Ajay Sahu, Kim Farmer;*

*Royal Cornwall Hospital Truro*

Over a period of three years from 2007 to 2010 the number of knee MRI requests from primary care rose from 7 per month to 100 per month with little change in the number of consultant referrals.

Both the orthopaedic department and radiology department felt that many of these MRI scans were unnecessary particularly in patients with clinical or plain film evidence of osteoarthritis, in fact many older patients with clinical signs of osteoarthritis had not had a plain film performed prior to the MRI request being made.

Guidelines were drawn up and distributed.

A re-audit showed a dramatic decrease in unnecessary scans performed from primary care and no subsequent rise in consultant referrals for MRI scans.

**P-139 A pictorial review of shoulder instability**

*Jonathan Crighton; Philip Hughes; Iuliana Botnarenco; Alexander Crowther; Peter Chapman; Plymouth Hospital; Peninsula Radiology Academy;*

A review of surgically occult lesions, lesions that influence operative intervention and MR findings that are often missed or incorrectly diagnosed. These lesions will include humeral avulsions of the glenohumeral ligaments (HAGL) which are frequently arthroscopically occult, labral lesions that are often missed or incorrectly diagnosed and Hill-Sach's lesions of varying sizes that modify surgical procedures.

We will illustrate the lesions and discuss the issues relating to the abnormalities along with their clinical and surgical significance.

**P-140 "Elementary my dear Watson!": the relevance of artefactual knowledge in imaging the skull and spine**

*Trupti Kulkarni, Sacha Niven; Walton Centre for Neurosciences; Whiston Hospital;*

**Objectives :** To draw attention to the tubes, wires and prostheses seen on imaging of the skull and spine. To illustrate some common artefacts and complications caused by these with relevant examples.

**Content:** There is a bewildering array of implants, wires and tubes which are inserted at various sites in the skull and spine. These may be incidentally seen, for example, in the setting of trauma, where previous history is unavailable to the clinician. Complications of these artefactual bodies are also well recognized.

**Relevance :** With increasing sub-specialization, role extension, and shift system working, junior clinicians have arguably less exposure to even basic procedures. A collapse of the firm system of clinical practice means junior clinicians are more and more dependent on radiologists for help and an interpretation of unusual appearances. The burden of responsibility thus falls on the radiologist to inform referring clinicians of the various artefacts (implants, tubes and wires) and also related complications in an expedient manner. It is also important for the radiologist to correctly interpret various artefactual difficulties caused by the presence of these foreign bodies. We provide selected images of a variety of implants, tubes and wires in various locations within the brain and spinal column. Selected cases where these cause complications or artefactual difficulties in interpretation are shown as learning tools, with discussion in each instance.

**Conclusion:** The knowledge and interpretation of artefacts on skull and spine imaging and possible complications is important to the radiologist as it has an impact on clinical care.

**P-141 Heal with steel: a pictorial review of proximal femoral fracture surgery**

*Neeraj Purohit; Liam Ingram; David Higgs; Leonard King; Department of Radiology, University Hospital Southampton, Southampton*

**Aims/Objectives:** In this pictorial review we will be providing an overview of orthopaedic implants used in the management of proximal femoral fractures as well as their indications. We will be presenting some of the complications associated with these implants.

**Content:** Around 75,00 hip fractures occur in the UK per annum with figures expecting to rise with an ageing population. Due to evolving technology, and advancements in engineering, there are an increasing number of different orthopaedic implants used in managing these fractures. There will therefore be more images that will need to be reported by Radiologists.

We will be reviewing intracapsular and extracapsular fractures in turn. We will demonstrate the various implants and fixation devices used in treating these fractures as well as their indications. We will cover some of the common recognised complications as well as a few unusual ones.

**Relevance/ Impact:** A broad understanding of the various orthopaedic implants used in the surgical management of proximal femoral fractures is important for a Radiologist. It can help the individual to better appreciate the biomechanics of the fracture and fixation, and it can develop an interest in musculoskeletal radiology. It can provide the trainee with knowledge to facilitate active participation in MDT meetings.

**Outcomes:** We believe this poster will be of educational value, especially for trainee radiologists.

## Other

### P-142 **MRI negative invasive breast cancers**

*Neeraj Purohit; Liam Ingram; David Higgs; Leonard King;  
Royal Free Hampstead NHS Trust*

**Objectives:** To analyse breast MRI of all patients who had histological proven invasive breast cancers and to correlate with the mammographic and ultrasonographic findings, reviewing the imaging findings in MRI negative invasive breast cancers.

**Content :** A retrospective analysis of the histological diagnosis of all newly diagnosed invasive breast cancers was done over a 3 year period from January 2009 to October 2011. These were then further analysed to find out the number of patients who had MRI scans as part of their investigations. Correlation of MR findings was done with the mammographic and ultrasonographic features.

**Relevance:** This analysis emphasises the importance of multimodality imaging in suspected breast masses. Outcome: Over a 3 year period of the total 339 patients with invasive breast cancers, 148 patients had MRI. The patient selection was based on the density of breast tissue, multifocality of cancer and histology on core biopsy. 144 (97.2 %) patients had true positive results and 4 (2.7 %) were false negative. All the false negative patients had normal mammogram. Ultrasonographic findings were benign in three patients and was normal in one patient.

**Discussion:** Invasive breast cancers can be mammographically occult and can present with benign features on USS. Breast MRI detects most invasive breast cancers but it is important to recognise that there are a small number of false negatives. Combination of multimodality imaging features with clinical and histological correlation to be done in all suspected breast masses.

### P-143 **Radiology of the pan corpus manifestations of histiocytosis x (LCH) seen in a 15 year old boy**

*Kamaria Prescod, Hussein Hassan; Z Al Ani; N Sumbwanyambe;  
North East Lincolnshire and Goole NHS trust*

**Aims/Objectives:** A look at the multisystem multifocal expression of LCH

**Content** LCH is one of the rarer but known conditions that children can present with. Typically apart from presenting systemic feature of bone pain and fever, skeletal manifestations are seen which help in guiding biopsy to establish the diagnosis. The disease on one of a spectrum of organ infiltration with epidermal dendritic cells(Langerhans cells) and can range from a variety of presentations. Most commonly radiologists see the skeletal manifestations(monosystemic) of lytic lesions. We have here a case of a teenager presenting with multisystem LCH with typical symptoms but aggressive course of the disease.



**Outcomes:** Plain film, CT examination for evaluation of abdominal pain lead to the discovery of the multisystem findings: Lytic scalp lesions on plain film, Multiple cyst like lesions in the lung and liver. MRI showed expansive mastoid lesions. Histological examination, these were confirmed to be LCH.

**Discussion.** The range of presentation of eosinophilic granulomas are well documented in ranging from single skeletal lesions to the fatal Letterer-Siwe syndrome, but the multisystem presentation in a teenager is a rare presentation and the pathology is reviewed

P-144 **Incidental findings in low resolution visceral adipose tissue magnetic resonance imaging scans**

*Karen Knapp; Joanne Welsman; Ian Summers; Richard Seymour; Jonathon Fulford;*  
*University of Exeter; South Devon Healthcare NHS Foundation Trust;*

**Aims:** To investigate the incidence of clinically significant incidental findings in a volunteer population undergoing MRI measurement of their VAT.

Content of Presentation: Forty-nine female volunteers were recruited for VAT measurement and their scans reported by a consultant radiologist.

**Relevance:** Visceral adipose tissue (VAT) measurements using magnetic resonance imaging (MRI) are becoming increasingly popular for quantifying the risk of diabetes and cardiac disease. Low resolution images are frequently acquired for this purpose to enable fast measurement. However, anatomical detail is still available and the presence of gross abnormalities easily detected.

**Outcomes:** The mean (SD) age of those with incidental findings was 51y (10.0) and 48.8y (13.2) for those without. There were 7 (14%) incidental findings of note in this volunteer population. However, because of the low resolution of the scans they could not be characterised accurately.

Whilst they were likely to be incidental findings such as simple renal or hepatic cysts, it was difficult to exclude other lesions. The patient's GP's were sent the MRI report to enable them to follow up the patients care. Other abnormalities that were not clinically significant were also noted, such as changes in the intervertebral discs, vertebral end-plates or patchy marrow signals.

**Discussion:** MRI-VAT measurements, which are acquired using a fast, low resolution pulse sequence yield anatomical information with the ability to identify significant clinical findings. It is recommended that such scans are reported by a radiologist or other expert in MRI image interpretation to ensure that any potential clinically significant findings are identified.

P-145 **Evaluation of CT urography as a second-line investigation in patients presenting with visible haematuria in the Highland Region**

*Ola Blach; Alistair Todd; Steve Bramwell;*  
*University of Aberdeen, School of Medicine and Dentistry; Department of Radiology,*  
Raigmore Hospital;

**Background** Visible haematuria is a cardinal symptom of urological malignancy, and is investigated initially with cystoscopy and ultrasonography. CT urography replaced IV urography as the second-line investigation in the Highlands in 2005 but its ability to detect significant urological pathology, not otherwise picked up by ultrasound and cystoscopy, has never been assessed.

**Method** Prospective observational study comparing the diagnostic yield of CT urography with first-line ultrasonography and cystoscopy.

**Results** The overall sensitivity of CT urography in detection of urological pathology was 94.0% vs. 61.2% of ultrasonography. Both were highly specific: 97.5% and 96.9%, respectively. Despite the good agreement between the two tests ( $\kappa=0.612\pm 0.059$ ,  $p<0.001$ ), detectability of pathology was significantly higher on CT urography (McNemar:  $p<0.001$ ), with 9.3% more 'abnormal' cases diagnosed, including 1 renal carcinoma, 2 benign renal masses, and 62% more calculi. Urothelial malignancy and hydronephrosis were equally well detected by both investigations. 225 'incidental' lesions were identified in 137/227 patients following CT urography.

**Conclusion** The management of patients with visible haematuria was not changed significantly by the use of CT urography. Therefore, ultrasonography and cystoscopy should continue to be used as the first-line tests for identifying the source of bleeding. CT urography should be reserved as a second-line investigation in older patients, those with additional risk factors, and for further evaluation of abnormalities detected on ultrasound or cystoscopy. One debatable benefit of CT urography lies in its detection of incidental asymptomatic pathology at the expense of additional radiation dose and higher cost.

P-146 **An audit of justified HSC-205 referrals in radiology**

*Sharath Hosmane; Simon Ainsworth; Sathi Sukumar;*

*University Hospital of South Manchester, Wythenshawe*

**Introduction** HSC-205 referrals are used for patients with either suspected cancer or staging of cancer before treatment and are dealt with quickly to comply with the time scale for treating cancer patients. The requests labelled inappropriately as HSC-205 would result in additional pressure on administrative and clinical staff in radiology. This instigated an audit to assess the clinical appropriateness of the requests.

**Method** The clinical appropriateness of all the HSC-205 requests in our department in the month of May 2011 was assessed.

**Results** There were 295 HSC-205 requests during the selected month. Majority (164) of them were computed tomography(CT) requests, 79 for ultrasound, 25 for MRI scans, 18 NM scans and 9 of them were for fluoroscopy. The specialty specific requests distribution were as follows: gastrointestinal(26.8%), chest(20%), gynaecology (18.6%), urology(13.6%), head and neck(11.9%), breast(6.8%), neurology(1.3%), orthopaedics(0.7%) and vascular surgery(0.3%). 90.5%(267) requests were found clinically justified to be classified as HSC-205. 10%(28) were inappropriately requested as HSC-205. Out of 267 justified HSC-205 requests, 244(91.4%) were for suspected cancers and 23(8.6%) for already diagnosed cancers. 32.8% of suspected cancers were reported as cancers.

**Discussion** Only 10% of all HSC-205 requests were not clinically justified. This could either because of ignorance or the requesting clinicians trying to take advantage of the quicker pathway. An addition of information bar in the electronic request system when HSC-205 is selected, a formal letter to all clinicians and informal education during multidisciplinary meetings have been undertaken in our department to improve the appropriate use of HSC-205 pathway.

P-147 **Ultrasound guided fine needle aspiration cytology of thyroid nodules - a single centres experience**

*Katie Giles; Lesley Archer;*

*Royal Cornwall Hospital; South Devon Healthcare Trust;*

**Introduction** Isolated thyroid nodules are investigated by means of Fine Needle Aspiration (FNA) Cytology. At our centre, six Radiologists undertake FNA sampling under ultrasound guidance with a non standardised approach. If FNA is deemed diagnostically appropriate, it is performed in isolation with the validity of the aspirated sample not being known until a later date. American Thyroid Association Guidelines 2009 state that non diagnostic cytology should be repeated under US Guidance; therefore patients with inadequate FNA samples require a second appointment for the procedure to be repeated. This study will identify the percentage of adequate cytology sampling across the centre and subsequent repeat procedure workload.

**Method** A CRIS search was performed to identify Ultrasound Neck examinations with FNA over a two year period. Each report was reviewed to determine if a Thyroid FNA had actually been performed. Each FNA event was reviewed in conjunction with the cytology results.

**Results** The CRIS search identified 187 events of US Neck with FNA. After exclusions were applied 144 events were eligible for review. Further results analysis is currently being undertaken.

**Discussion** Adequate sampling rates are expected to below recommended levels. The centre is currently undertaking a review of the service in an attempt to create a 'one stop clinic' where ENT

Surgeons, Radiologists and Cytologists all convene to aid a streamlined service. With the addition of 'instant feedback' to the FNA procedure i.e operators find out immediately if patients require a further FNA, patient diagnosis will be quicker and require less repeat appointments.

## Student Radiography

**P-148 Distribution of common cardiac disorders diagnosed by echocardiography in a tertiary cardiac care centre: a descriptive study**

*Saima Shaffaque; Annum Dawood; Muhammad Masudul Hasan Nuri; Iffat Tasneem; University of Bradford,; Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan.; Tahir Heart Institute, Rabwah, Pakistan;*

The objective of this study was to outline common abnormalities, observed in a population of patients who came to a tertiary cardiac care centre. Moreover, to review the spectrum of these abnormalities those are encountered in a high volume.

We conducted a retrospective study in 296 consecutive patients with heart abnormalities. Of these 11.1% paediatric, 63.5% adult and 25.3% geriatric patients were identified. Both out-patients and in-patients were examined and their reports subsequently formulated. Out of these 53.0% were males and 46.6% females. Patients' age, sex and medical record number were extracted from their reports after obtaining consent from ethical review committee of the hospital. Three echo-cardiographers interchangeably performed the examinations that were enrolled in the study. Toshiba Nemio XG machine was used. Standard views were obtained depending upon clinical information; however for most of the patients the operators obtained conventional four views.

Out of 296 patients, 64.5% were normal of which 31.4% were females and 32.0% were males. Most common abnormalities identified were Myocardial Infarction (35.1%), Congenital Cardiac Disorders (5.4%), Acquired Heart Diseases (19.5%), Pulmonary Stenosis (1.0%) and Pulmonary Embolism (0.3%). Eighty two [27.2%] cases were reported as technically difficult study.

In a tertiary care centre, a wide variety of diseases with a large number of patients normally presents. It is deduced from the current study that echocardiographic information must always be correlated with clinical information. Owing to high sensitivity of echocardiography, it must be made first choice for the assessment of heart disorders along with other baseline imaging

**P-149 An observational study on the outcome of the diagnostic imaging in the management of pulsatile tinnitus**

*Ali Al-Omari; Caroline Holland; Ziad Husain; Sheffield Teaching Hospitals NHS Trust; Walsall Healthcare NHS Trust; Boston Hospital NHS Trust;*

No abstract available

**P-150 Paediatric extrapulmonary TB – new concepts in imaging**

*Ranbir Sandhu; Afshin Alavi; Joanna Danin; MaiAi Seah; Bhanu Williams; Sam Walters; Imperial College Hospitals NHS Trust*

**Objectives :** Extrapulmonary Tuberculosis (TB) is an increasing problem accounting for more than 20% of cases. Children appear to have a higher risk of contracting extrapulmonary TB involving any organ.

TB is difficult to diagnose and the standard established diagnostic tests (including indirect signs of low epidemiological specificity, symptoms, a chest radiograph and an intracutaneous tuberculin test) are often inconclusive and microbiology tests are time consuming.

The purpose of our study is to highlight the necessity of new imaging concepts, to rule out the role of different modalities and to review the characteristic imaging findings of various forms of extrapulmonary TB.

**Content :** We reviewed the Paediatric extrapulmonary TB cases in our hospital (a referral centre for paediatric infectious disease) in the last 3 years. Subsequently we evaluated the diagnostic value of different imaging modalities including US, CT & MRI and correlated these with the disease activity.

**Relevance/Impact :** From a total of 81 paediatric TB cases, 15 had extrapulmonary TB in the last 3 years in our hospital (including abdominal, musculoskeletal, lymphatic, middle ear, CNS and miliary spread).

**Outcomes:** Extrapulmonary TB in children is increasing in prevalence and severity partially due to their immature immunity, social and economic dependency with adults and also from the increasing number of HIV infections.

Our study shows the need for using new imaging concepts using different modalities (US, MRI and CT) to improve the diagnosis of extrapulmonary TB.

P-151 **Imaging findings in early and metastatic pancreatoblastoma**

*Zahia Zaitout, Thuzar Win;*

*The Neuroradiology Department, The Royal Hallamshire Hospital, Sheffield.*

Pancreatoblastoma is a neoplasm of the paediatric population, which generally has a favourable prognosis. Metastatic pancreatoblastoma, in the other hand, has a poor prognosis. The aim of our poster is provide image illustrations of pancreatoblastoma appearances on different modalities including ultrasound, computed tomography CT and magnetic resonance imaging MRI (including DWI). The poster also emphasises the role of blood LDH level and MRI with DWI in the follow up and detection of metastases.

P-152 **A critical appraisal of the information available to and given to bone scan patients in South Wales**

*Hywel Rogers; Zainab Bello; Cardiff University*

**Aim and objectives:** To critically evaluate the information available and given to bone scan patients in South Wales. This was carried out by assessing bone scan information leaflets from 10 hospitals in South Wales and information available on the internet.

**Method:** The information sent out by nuclear medicine departments was gathered and information sources available on the internet were searched using a general search engine. Evaluation of the quality of information was assessed by an experienced radiographer in radionuclide imaging and considered procedure preparation, contraindications, complications/risks, aftercare, result availability, links to other relevant websites, visual support and contact details. The readability of the material was assessed using the Flesch reading ease tool.

**Results:** The overall quality of the information from all sources was low, with scores between 27% and 66%. Readability scores from the Flesch reading ease chart showed that most sources were easy to read except for 3 hospital leaflets and 2 websites, which were below an agreed standard score of 60.

**Conclusion:** The information available and given to patients for a radionuclide bone scan examination is not comprehensive. While the readability score for most of the information was good, there were some sources that could be difficult for patients to read.

P-153 **Dose creep in chest radiography – the potential for over exposure**

*Wang Kei Ma; Peter Hogg; Michael MacKenzie; Kelly Judith;*

*University of Salford; Pennine Acute Hospitals NHS Trust; Countess of Chester Hospital NHS Trust;*

**Purpose** It is said that digital medical imaging technology allows for effective dose (E) to be increased whilst image quality is preserved. This 2nd year BSc Radiography experiment investigates how image quality and lesion visibility vary with E. Acquisition parameters (SID, kVp, mAs) were manipulated to vary E.

**Method** Using computed radiography, 545 radiographs were acquired of an anthropomorphic chest phantom under different acquisition parameters. Two 5mm bead nodules were inserted to mimic lung lesions. E was calculated by MonteCarlo modelling and measured using TLDs. Using a 5 point likert scale, image quality and lesion visibility was evaluated using a forced choice perceptual comparison method. Bespoke JAVA software, employing dual screen display, was written for this task. Image quality criteria were adapted from the Commission of the European Communities chest X-ray criteria. 2 of 5 volunteers (radiologists / reporting radiographers) have scored the images so far. Minimum and maximum E values for images of acceptable image quality / lesion visibility were identified at SID and kVp values. Results so far Measured and modelled E correlated closely ( $R^2=0.9554$ ). The window width of acceptable image quality varies with SID and kVp. For the acquisition parameters, minimum and maximum E which may be used to produce an acceptable chest radiograph varies from  $2\mu\text{Sv}$  to  $198\mu\text{Sv}$ .

**Conclusion** Potential for overexposure increases at lower kVp and higher SID values. For the chest phantom, an overexposure factor of 99 is permissible. This gives significant latitude for dose creep to occur if unchecked.

P-154 **The effect of KVP and focal spot size on perceptual image quality of a hand X-ray image**

*Wang Kei Ma; Peter Hogg; Sue Norton;*

*University of Salford*

**Background:** Year I Radiography students conduct a week-long laboratory-based research project to determine the relationship between kilovoltage (kVp), focal spot size and perceptual image quality.

**Purpose:** For posterior-anterior (PA) oblique hand, determine how kilovoltage (kVp) and focal spot size affect perceptual image quality.

**Method:** Using computed radiography (CR), 36 images of a PA oblique hand phantom (PIXY) were acquired at 40kVp stepping through 5kVp increments to 125kVp. At each kVp setting an image was acquired under fine and broad focal spot sizes. mAs was fixed. Images were displayed on quality controlled monitors with dimmed ambient lighting. Look up table (LUT) for hand was used for image display. 6 participants scored each image twice using a 5-point Likert scale for perceptual image quality.

**Results:** No difference in image quality was found between fine and broad focal spot sizes ( $t=2.0322$ ,  $df=34$ ,  $p=0.7408$ , two-tailed). For both spot sizes, quality increases gradually from 40kVp; around 65kVp it starts to decrease. This sharp reduction is likely due to CR system overexposure. To take this into account the experiment should be repeated at lower mAs values.

**Conclusion:** Broad focal spot size can be used for PA oblique hand imaging without affecting perceptual image quality. This may lengthen tube life. Whilst perceptual image quality is around 50-55kVp further research is recommended to establish whether a reduced mAs beyond this kVp value could result in further improvement in image quality.

P-155 **Radiology reporting turnaround from exam ordered time to sign off on intensive care unit requests**

*Natalie Byrne, Countess of Chester Hospital*

**Introduction.** Intensive care units treat those with acute, reversible and critical medical problems, and radiology utilised in patient investigation can be of great use. Guidelines suggest a turnaround time of 30 minutes for all urgent cases and a same day turnaround for inpatient and A&E requests[i].

**Aims.** This retrospective audit was conducted to analyse the reporting turnaround time for radiology requested from the intensive care unit at the Countess of Chester Hospital between January 2011 and June 2011 inclusively.

**Method.** A list of 438 requests was pulled from the MEDITECH database of all X-ray, CT, MRI, ultrasound and interventional radiology requests. Dates entered into the system for radiology orders were compared to dates for exams carried out and final report sign off dates.

**Results.** 13 of the 438 entries had an exam date that did not match the ordered for date however only 19% of radiological images were signed off on the same date as they were ordered in ITU. Of the 350 X-rays ordered only 9% were completed on the same day. 84% CT head scans were completed on the same day. 63% of ultrasounds were completed inside the order date.

**Conclusion.** A delay in radiology turnaround times can lead to suboptimal care for ITU patients. Departmental procedures have to be reviewed and modified to ensure optimum treatments and care for this group of patients.

[i] National Diagnostic Imaging Board - July 2008 Radiology Reporting Times Best Practice Guidance

**P-156 Comparing the use of PGMI scoring systems used in Cambridge and Oslo to assess the technical quality of screening mammograms: A pilot study**

*Michelle Boyce; Soph Willis; Deepak Parashar; Kathryn Taylor;*

*University Campus Suffolk, Ipswich; Cambridge Cancer Trials Centre. Dept of Oncology, University of Cambridge, Cambridge Breast Unit, Addenbrookes Hospital*

**Aims:** To compare use and interpretation of the PGMI image evaluation system within and between two breast units (UK and Norway). To determine differences in technical quality (TQ) of mammograms and contributory factors, enabling suggestions for future assessment of TQ.

**Content:** Digital mammograms from 112 consecutively screened women were sourced in each centre. Test-sets contained mammograms (four images each) from each PGMI category which were individually scored by 4 mammographers, each with  $\geq 4$  years' experience, using their local version of PGMI. Each image was categorised P, G, M or I and reasons for scoring less than perfect documented. The mammogram was then given an overall PGMI score. Mammograms were individually assessed as adequate or inadequate by 4 breast radiologists each with  $\geq 4$  years' experience. Test-sets were exchanged and the process repeated. Kappa statistical analysis was used to assess the significance of differences in PGMI use and agreement between the two centres (analysis:ongoing ).

**Relevance/Impact:** Classification systems such as PGMI may be subjective and interpreted locally. Mammographer training varies between countries and TQ may be perceived differently by radiographers and radiologists. An objective and standardised critique of mammographic TQ in breast screening may increase cancer detection, reduce technical repeats and facilitate accurate comparison of radiographic performance between centres and countries.

**Outcomes:** To inform future research and practice in the standardised assessment of breast screening TQ.

**Discussion:** Preliminary findings suggest variation in practice assessing TQ of screening mammograms. Further research is recommended comparing multiple scoring systems to inform practice on an international scale.

**P-157 Assessment of basic bio-chemical parameters: An aid for assessing stroke severity?**

*Sneha Ananth; Komala Govindharajalu; Vijayalakshmi M; Nagendran R;*

*Kilpauk Medical College, Chennai, India*

**Aim:** To assess the alterations in fasting blood glucose(FBS), potassium, magnesium and uric acid in acute stroke patients. Compare it with CNS score (MRC grading/Ashworth scale) for assessing stroke severity.

**Methodology:** This is a case control study with a population of 90, equally divided into 3 groups- Acute stroke patients, previous history of stroke and controls, all with no previous history of diabetes. The samples collected were immediately analysed for FBS and routine parameters using standard enzymatic kits in Autoanalyser. Electrolytes were analysed using flame photometer. Student's t test and spearman's rank correlation was used.( $p < 0.050$  is significant).

**Impact:** 60% of those who suffer stroke die or become dependent according to WHO. Assessing common bio-chemical parameters as markers of neuronal recovery would be valuable in primary care level and it may also serve as an aid in imaging studies to arrive at a correlation about the lesion

and its impact. Alteration, if normalized, could also lead to a faster and better recovery, with due caution of toxicity.

**Outcomes:** 2/3<sup>rd</sup> of study population has hyperglycaemia. Comparative hyperkalemia and hypomagnesemia was also observed. Hyperuricemia was prevalent in acute stroke group with a mean value of 7.5mg/dl. On comparing with CNS score, glucose showed negative relationship whereas magnesium and uric acid showed positive correlation.

**Discussion:** Uric Acid emerges to be a new marker of stroke severity. Magnesium, with the greatest significance with CNS score(lower the value, lower the CNS score) in this study, may indicate its neuro-protective effect and future trials confirming its supplementation may have an positive impact on neuronal recovery of the patient.